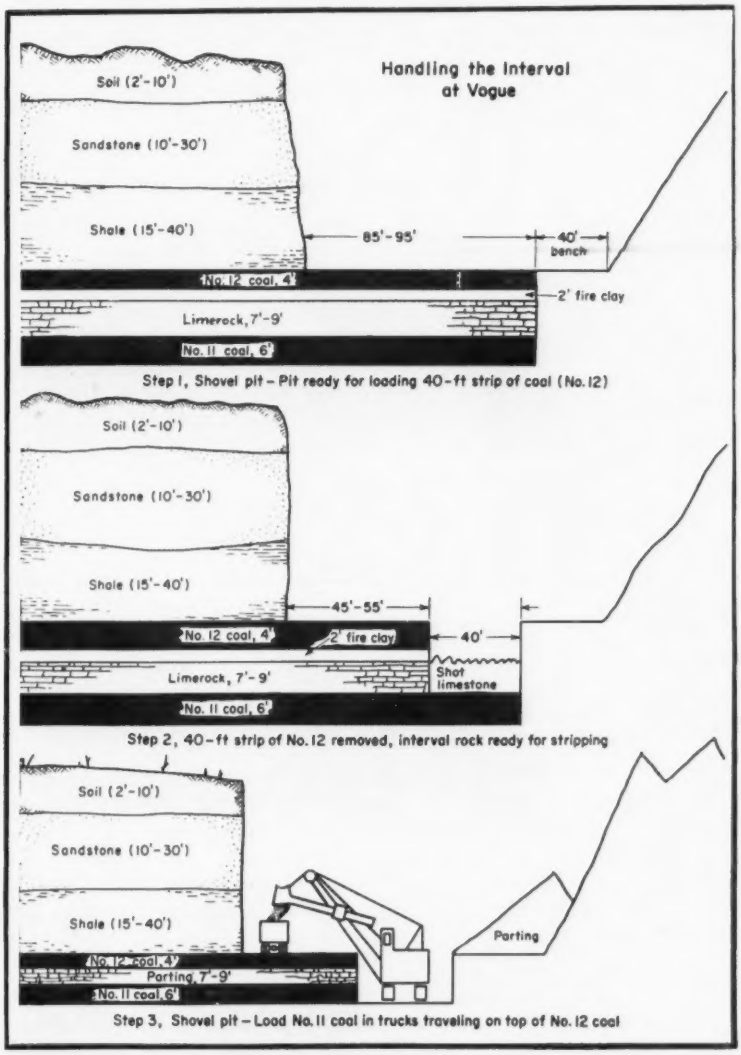
COAL AGE

OCTOBER 1960
PRICE $1

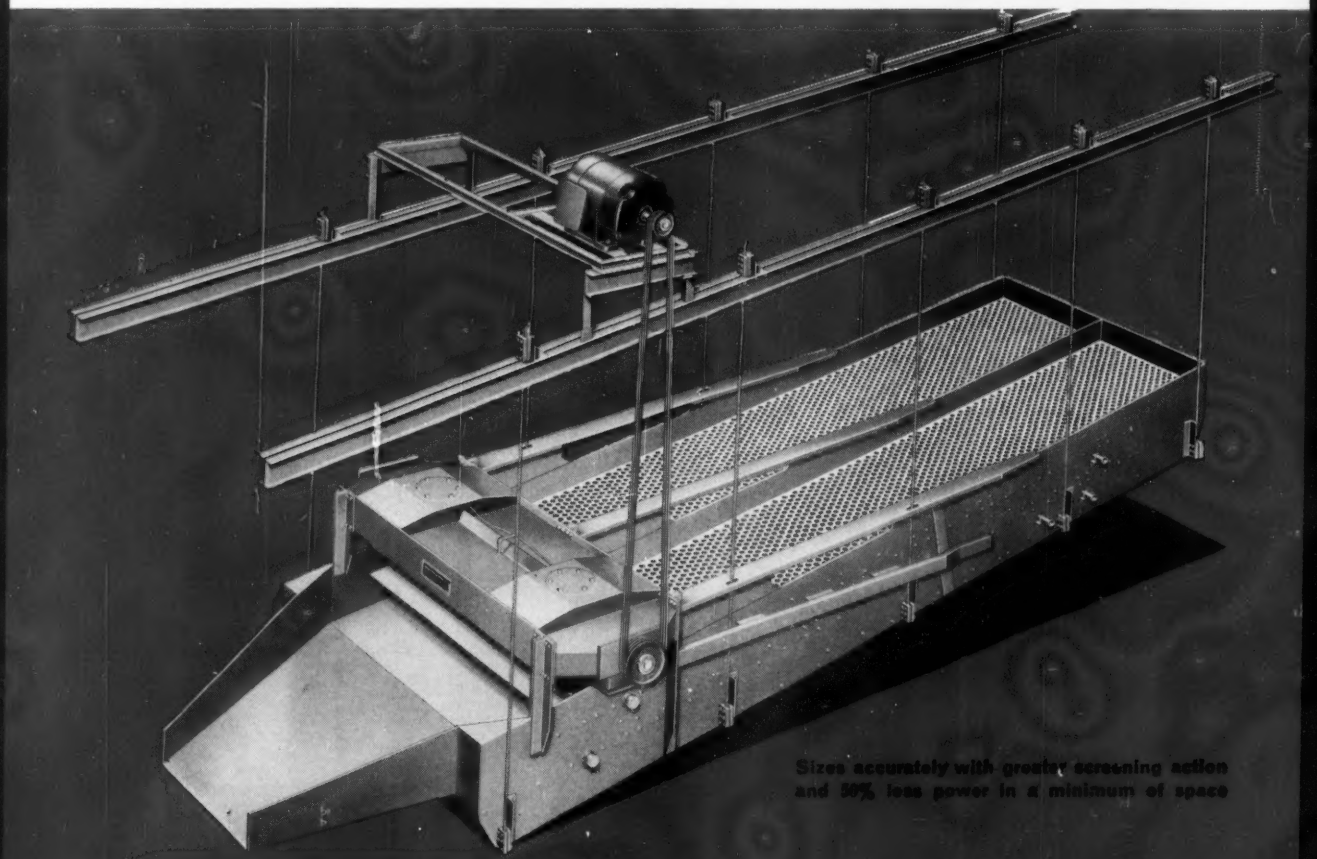
Coal vs Oil Outlook . . p 72
Underground Shop . . p 100

A McGRAW-HILL PUBLICATION



Special Equipment Marks Two-Seam Stripping at Vogue Mine . . . . p 76

SAVES SPACE—SAVES POWER—SAVES MAINTENANCE



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FAIRMONT, WEST VIRGINIA

ENGINEERS • DESIGNERS • FABRICATORS and CONSTRUCTORS

Hose feeds machine that makes coal come clean

IT TAKES 15,000 gallons of sand and water a minute to operate that cone-shaped coal washer. The swirling mixture gets rid of the rock and shale mined with the coal.

But how to pipe the thick, sandy solution into the tank at different levels and keep it circulating? It's so abrasive it would wear holes through metal pipe in no time.

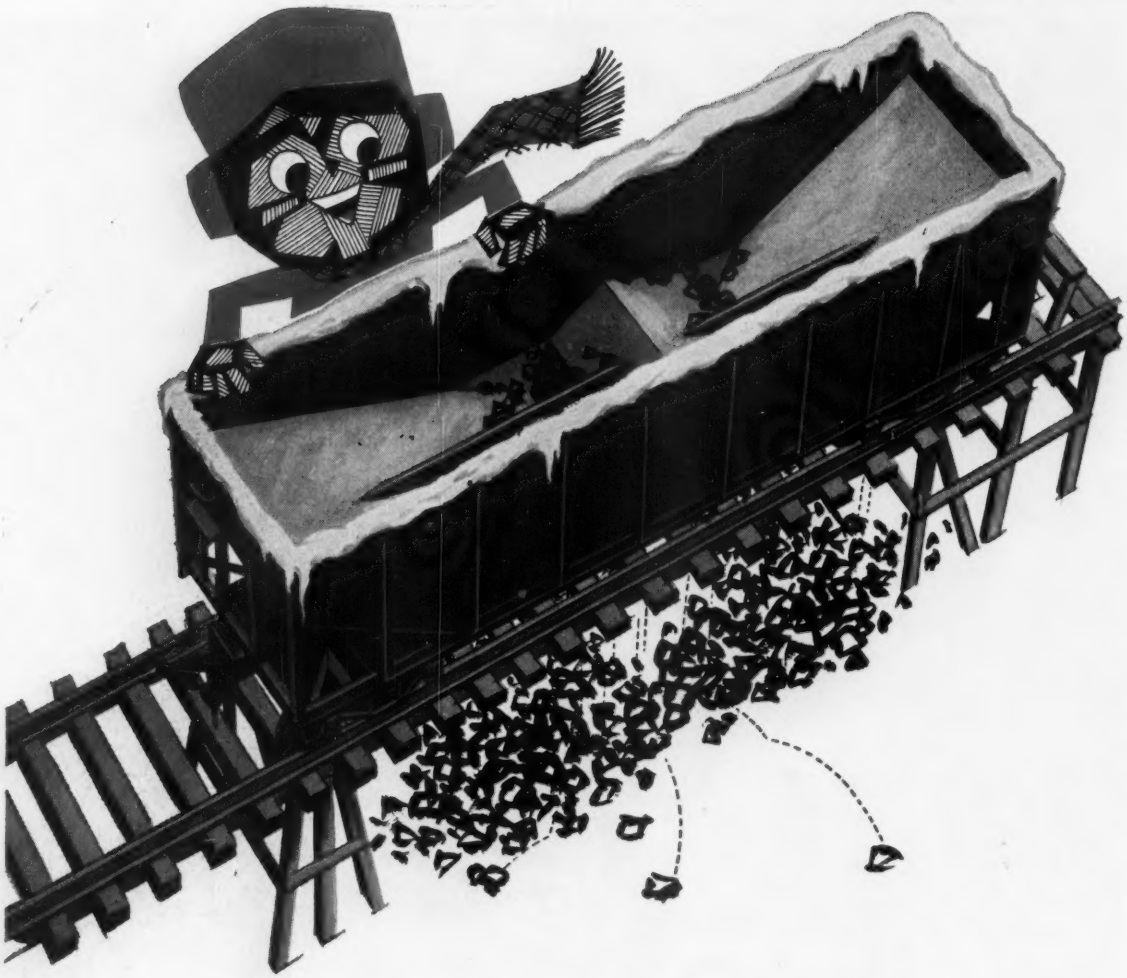
Coal company engineers remembered that a rubber hose developed by B.F.Goodrich had given unusually good service handling rough materials in another installation. This BFG hose is made with a special lining of the toughest wear-resisting rubber known. The rubber is so rugged that on many jobs it outlasts the hardest steel 10 to 1.

Some 42 lengths of B.F.Goodrich rubber hose were installed. You see several sizes of it in the picture, delivering sand and water to the tank. The coal company's chief engineer expects this hose to last six or seven years—many times longer than pipe.

Your B.F.Goodrich distributor has full information on the BFG hose described here. And as a factory-trained specialist in rubber products, he can answer your questions about the many rubber products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Company, Department M-926, Akron 18, Ohio.*

B.F.Goodrich

RUBBER HOSE



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ASHLAND OIL & REFINING COMPANY, Ashland, Kentucky

NOW! Westfalia Coal Planer For Thick Or Thin Seams, Full Roof Control . . . True Continuous Mining!

The Westfalia Coal Planer, the only *truly* continuous miner, with new Westfalia self-advancing, hydraulic roof supports and the ability to operate in thick or thin seams, will cut costs while increasing production. The Westfalia system is fully adaptable to room and pillar mines.

You reduce costs because the durable Westfalia Coal Planer lowers maintenance and repair expenses, requires no other roof supports or bolting and is operated by a minimum crew. You eliminate cutting, drilling, explosives and all other loading equipment.

Production goes up because you extract all the coal across a working face which may extend up to 800 feet or more. Production is continuous since the Westfalia planer, conveyor and self-advancing roof supports press continually against the face. Burnt or sticking top coal is removed by the planer automatically.

The Westfalia System, first brought to this country through the cooperation of the U.S. Bureau of Mines and a coal producing company, has proved itself in several hundred installations in all important coal mining areas of the world. Results soon will be available from the latest installation in West Virginia.

Use coupon below, clipped to your letterhead, for further information. Consultation on engineering or equipment problems is readily available from our technical personnel at no obligation.

Mining Progress, Inc.
Sole Distributors for Westfalia Lünen
HIGHLAND MILLS, N.Y.

Mining Progress, Inc.
Highland Mills, N.Y.

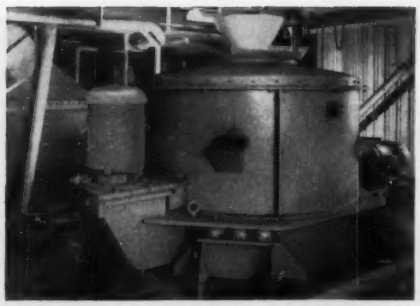
I'd like to know more about the Westfalia System, the coal planer, conveyor and new hydraulic roof supports and how it can reduce costs while increasing production in thick or thin seams.

Name_____

Title_____

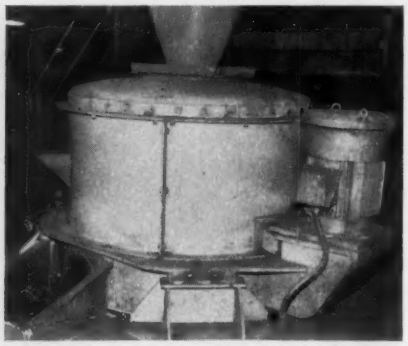
Company_____

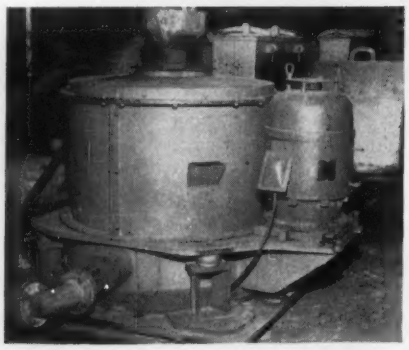
Address_____



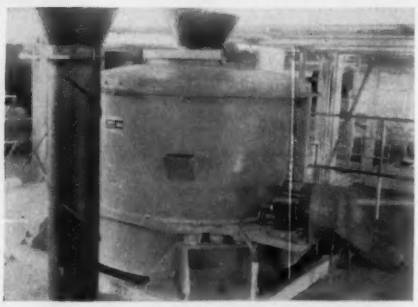
On minus ⅜" in one of the finest, new preparation plants in an Illinois strip mine

On 1" x ¼" in a long established West Virginia preparation plant. Eliminates the freezing problem.





On minus ⅜" in a deep mine operation on Pittsburgh seam coal



On 1" x ¼" in one of the industry's most up-to-date preparation plants

ON FINES ON STOKER SIZE

BIRD-HUMBOLDT SCREEN CENTRIFUGES

Offer you these outstanding advantages

THOROUGH DEWATERING

ON FINES

The minus ⅜" from sludge tanks or screens is delivered as dry as can be obtained mechanically — 4 to 6% surface moisture.

ON STOKER SIZE

Stoker size coal comes out at 2 to 2½% surface moisture, dry enough for direct delivery to the cars without danger of freezing — without thermal drying expense.

ALMOST NO DEGRADATION

This applies to either size range. It's due to the unique, gentle oscillating action. No scrapers or scrolls.

EXTRAORDINARY SCREEN LIFE

Even on Pittsburgh seam coal, Bird-Humboldt screens operate for thousands of hours.

LOW POWER COST

Less than 0.2 KWH per ton of dewatered coal.

HIGH CAPACITY

On either size the Bird-Humboldt turns out well dried coal at rates up to 80 tons per hour.

98 TO 99% SOLIDS RECOVERY

Isn't this the way to dewater your coal? Let us mail you the latest descriptive bulletin on the Bird-Humboldt.

BIRD-HUMBOLDT *Centrifugal Coal Dryer*

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OCTOBER, 1960

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New Underground Shop Improves Maintenance ..... p 100

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► Competition

Coal Outlook: vs Oil ..... *p 72*

W. A. Raleigh Jr., Associate Editor, *Coal Age*

No evidence crops up to show oil is planning any new offensive on coal markets. But other adjustments to a slower rate of demand growth will stress (1) solving the problem of oversupply, (2) programming refinery output for most promising profit-making opportunities, (3) developing new uses and markets, (4) minimizing political interference in the free competitive market system.

Packing a Punch—Petroleum economists give candid views re residual oil battle, market development, minimizing political interference.

► Stripping, Preparation

Special Equipment, Three-Step Preparation Mark Two-Seam Stripping ..... *p 76*

A. E. Flowers, Associate Editor, *Coal Age*

Two seams at Vogue mine separated by 2 to 9 ft of hard limestone and 2 ft of fireclay are recovered by 14-yd dragline in one pit and a 33-yd shovel plus special 6- or 9-yd interval handling-loading shovel in the second pit. Bank preparation employs high-capacity horizontal and vertical drills, and features:

Company-built horizontal auger that drills an average of 1,000 ft of 9-in hole per shift.

Mechanical tamping of horizontal holes,

Vertical rotary dry-type drilling and buffer shooting,

Self-propelled drills with two and four air-powered units for sinking holes in the thin, hard limestone interval.

Vogue preparation plant includes a primary washing circuit with middlings rewash, plus a crushing, rescreening and blending circuit.

Added Dividends—Hydraulic auger addition and removal in sidewall drilling; quick-change dippers; stainless-steel refuse chute linings.

► Better Reading

How to Cut Your Reading Time ..... *p 86*

Ability to read and comprehend faster gives you more time for thinking and other necessary activities. Methods of increasing reading speed include reading by phrases, looking at the space above lines instead of at the lines themselves, reading down columns line by line, not allowing your eyes to read either end of the printed line, speed reading sessions from time to time, pre-reading to get the big ideas first, summarizing, and reading in the right environment.

What's Your Speed?—Reading time of the article on reading starting on p 86 of this issue is 11 min. Can you do it in less—and get the main ideas?

► Coal Handling

Minimizing Size Segregation in Reclaiming Stored Coal ..... *p 92*

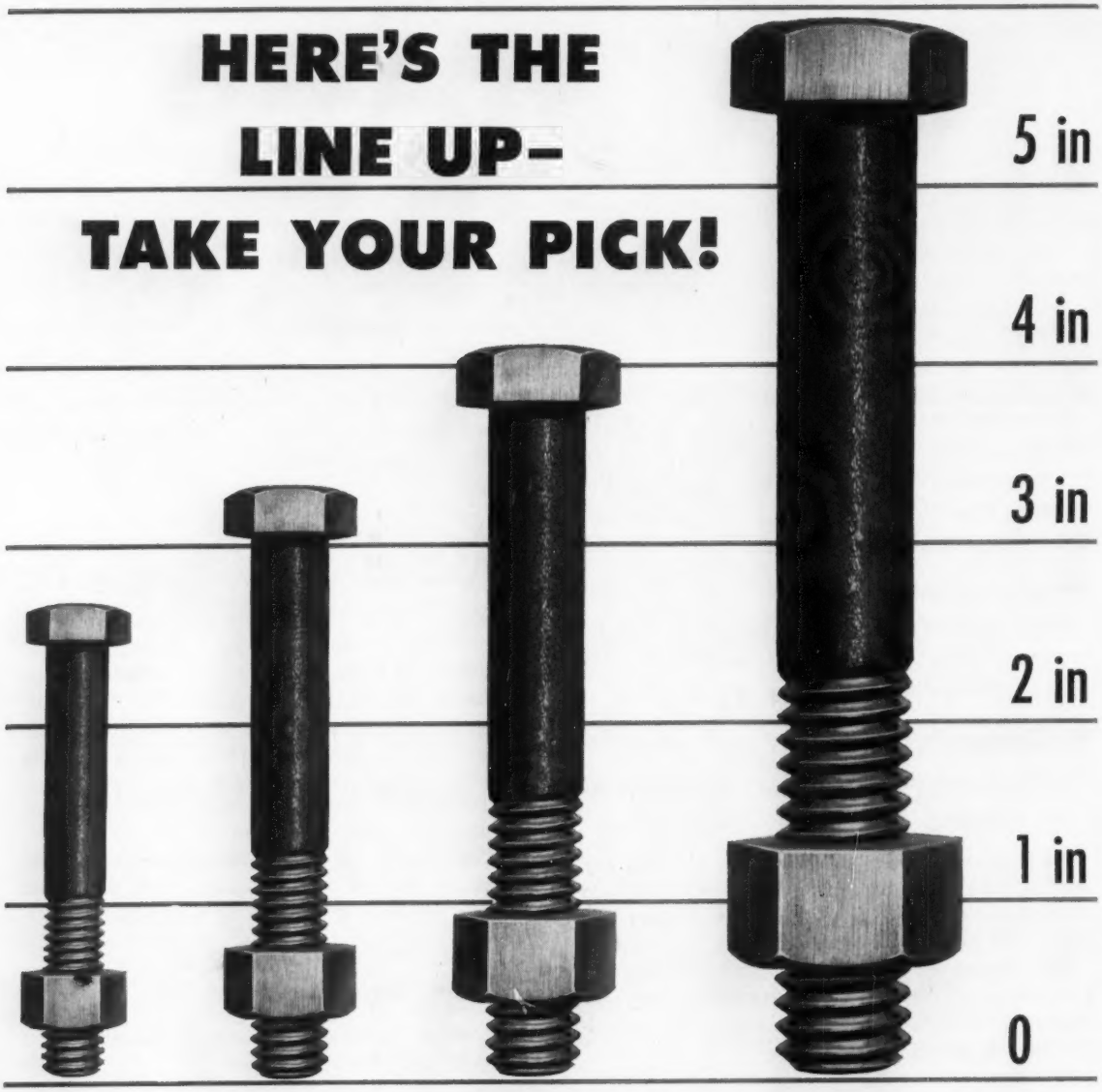
James B. Matthews, Templeton-Matthews Corp., Terre Haute, Ind.

Simple conical device forms auxiliary bottom in conventional bin or hopper to restore size consist of draw-off to approximately that of the feed to the bin. Held at the proper distance from the main bin bottom by ribs, the gravity blender has no moving parts and can be installed in existing bins and hoppers without reducing capacity.

Modus Operandi—Retardation of the removal of the center core material and draw from various zones over the entire cross section of the bin bottom.

COAL AGE, October, 1960, Vol. 65, No. 10. Published monthly by McGraw-Hill Publishing Co., Inc. U. S. subscription rate for individuals in the field of the publication $3 per year, single copies $1 (for rates elsewhere see p 9). **Executive, Editorial, Circulation and Advertising offices:** McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y. Printed in Philadelphia, Pa.: second-class mail postage paid at Philadelphia, Pa. **Postmaster:** Please send form 3579 to Fulfillment Manager, Coal Age, 330 W. 42d St., New York 36, N. Y.

HERE'S THE LINE UP— TAKE YOUR PICK!



In the market for machine bolts?
We make a full line of sizes,
Carriage, and lag bolts also.
And they're all top quality.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation.

BETHLEHEM STEEL

Steel

for strength
. . . economy
. . . versatility

► Hydraulic Fluid

Fire-Resistant Fluid: Harwick Mine Experience . . . . . p 96

J. A. Younkins, Assistant General Superintendent, Coal Dept., and **M. E. Fowler,** safety engineer, Harwick mine, Duquesne Light Co.

Starting with a shuttle car in January, 1958, a complete continuous-miner unit engaged in development has been put on a water-in-oil emulsion. Mixing is done on the job and the fluid is delivered in 5-gal cans to avoid the possibility of stratification. Failure of hydraulic components has not been abnormal in view of the development nature of the work, with the result that overall maintenance has been no more than with oil. Performance has been satisfactory and the cost of the fluid has been somewhat more than 1¢ per ton higher than oil.

To Do or Not—Mixing fluid on the job vs. buying it with the water in it.

► Maintenance Ideas

New Underground Shop Improves Maintenance . . . . . p 100

New underground shop at Mathies mine, Finleyville, Pa., employs 31 specialists to handle work that includes complete rebuilding of mining machines. The new facility, 8 mi inside the mine, replaces a former shop that served the operation for 10 yr. Example of the benefits: Two men can change the trucks on a 50-ton locomotive in 1½ hr. Well-lighted working bays and a set of machine tools that includes a lathe, hydraulic press, drill presses, hydraulic tester, power grinders and electric welders, are important in the maintenance of a long list of Mathies machines.

For Your Planbook—Diagram of shop layout.

► Training

TCI Coal Mines Training Program . . . p 108

Walter H. Fleming, Supervisor of Training, Coal Mines, Tennessee Coal & Iron Div., United States Steel Corp., Fairfield, Ala.

TCI's management development program has the objective of building and perpetuating the strongest possible management organization. Main topics at all-day monthly training meetings are safety, operational procedures, cost control, leadership and human relations. Basic principles of effective speaking also are taught to increase effectiveness of internal communications.

Special Features—Training session agenda and outline of special courses.

This Month in COAL

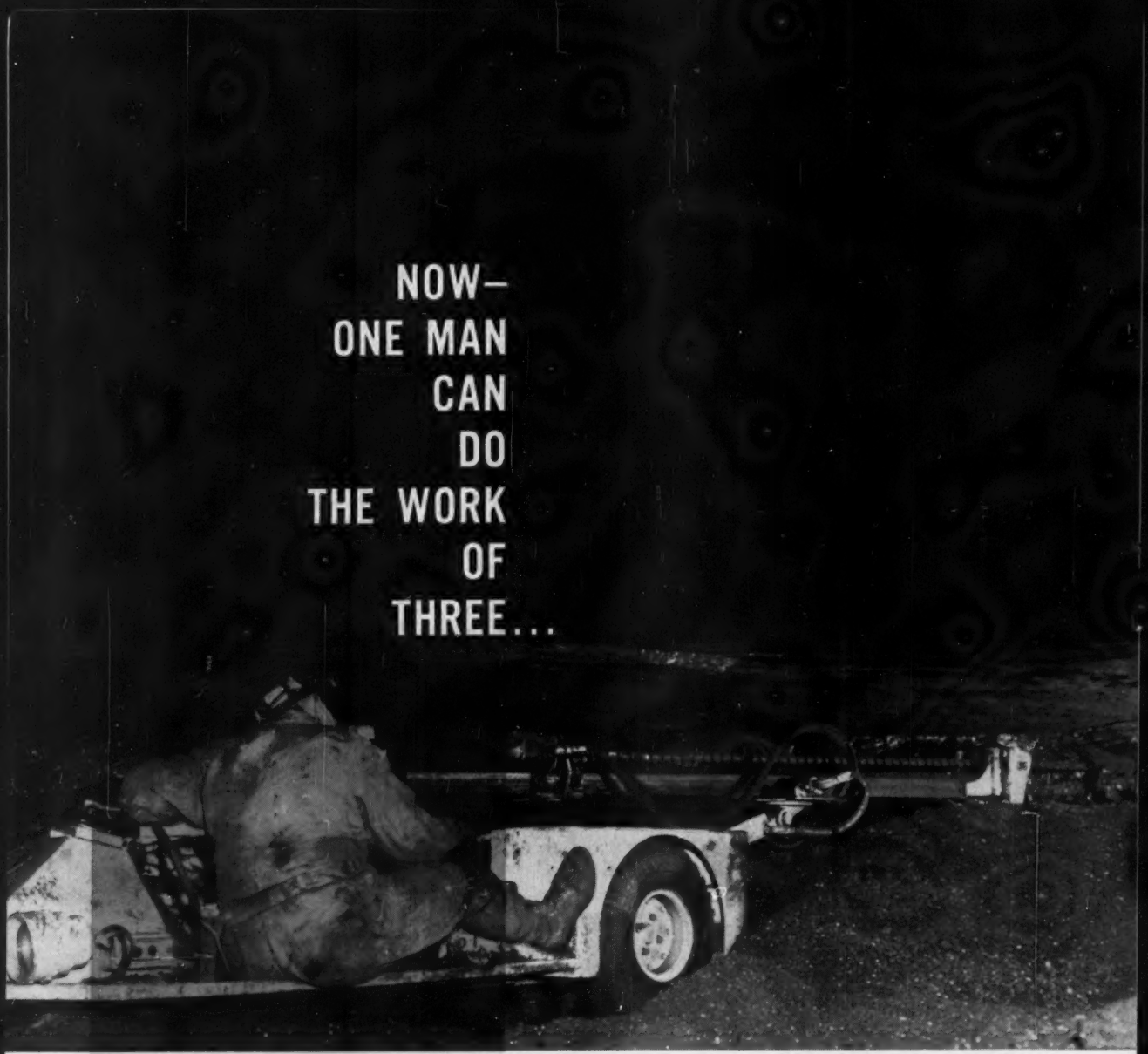
THIRD TO THE RESCUE—Credit for the 1960 increase in bituminous output must go largely to those consumers who upped their takings in the third quarter. As a result of their operations, and in spite of the Pennsylvania Strike, the industry finally was able to show a gain over 1959, and as a further result should wind up 1960 with a plus of 10 million or better—but not much more because of the continued recession in business. But in these days any increase, such as the 2½% or so in the cards for 1960, is a real plus.

IN '61—A fair number of the economic experts are not optimistic for 1961, with some flatly predicting continued recession or a depression. Could be—or perhaps such near-unanimity of agreement could mean that the turning point has arrived, since the latest of the recessions showed up when there was near-unanimity that things were going to keep right on being good. But theories aside, nothing in the present economic picture indicates any boom in the immediate future. By the same token nothing bars a turnaround and a rising rather than a static or falling level of business activity. It could happen anytime.

IN THE LONG RUN—Reports that TVA expects to burn 300 million tons of coal in the next 10 yr, reaching an annual consumption of 40 million by 1970, is one indication, temporary slowdowns to the contrary, that bituminous coal has a sound growth future. One reason is a further substantial rise in tons per man this year, with others in prospect for at least 5 yr and quite likely more. As a result the cost hurdle gets higher and higher for competitors even with the aid of cheap imports, which get less cheap almost by the month as foreign nations and owners raise their royalty rates and wellhead prices.

FUEL-RATE EFFECTS—Successful use of natural gas in blast furnaces to replace a part of the coke is a reminder that economy in use is still a factor in the outlook for the future. But losses by reason of economy may be offset, in part at least, by gains elsewhere. TVA, as an example, has found that coal lends itself quite well to the production of elemental phosphorus, opening up a new market. And there are many other possibilities. In short, fuel rates will continue to go down but the losses probably will be recouped, to a considerable extent at least, by new outlets, as well as the continued growth of the economy.

RAIL, WATER AND PIPE—Against the backdrop of a request for a general rate increase albeit a comparatively modest one, railroads continue to cut rates to specific points on specific sizes and in cargo lots. Thus the minor revolution in coal transportation continues. The next major development could be the burning of an "almost-colloid" slurry directly from the pipeline. And water's share of the coal movement could increase 50% or more in the next decade. An era of no rise in cost of moving coal to market—and possibly even a decrease—appears to be in the offing, if not already here.



LONG TDF-10 Mobile Coal Drilling Machine shown drilling over dust after cutting. Unit is equipped with racks for AIRDOX tubes.

By utilizing a LONG Mobile Coal Drilling Machine and the new AIRDOX System of Mobile Multiple Shooting, one man can quickly handle drilling and shooting in all seam heights, even as low as 28″. Result: you can realize substantial savings in face preparation costs.

Here's but one example of how this system works. The operator drills four holes, inserts AIRDOX tubes, and then shoots them in proper sequence *and in a single operation.* The new AIRDOX automatic discharge heads enable tubes to be reused any number of times without removing or replacing shear strips. And AIRDOX non-explosive shooting produces a better product that's easier, more economical to load and clean.

The LONG TDF-10 Mobile Coal Drilling Machine offers features that will enable more mines to take advantage of these benefits of AIRDOX Multiple Shooting. This self-tramming, highly maneuverable machine has a "rotary thrust" drill head, with auger guides positioned only 10″ from the face. It provides faster, surer drilling . . . will drill a 9′ hole in only 12 seconds.

For complete details on this cost-cutting system for one-man drilling and shooting, ask your Long-Airdox representative; or write Long-Airdox Company, Division of Marmon-Herrington Company, Inc., Oak Hill, West Virginia.

LONG-AIRDOX

► Conveyor Haulage

Belt-Haulage Economics .....p 112

Arnold Asman, Product Manager, Mining Dept., Hewitt-Robins, Inc.

Continuous availability, low installation and operating costs, reduced loading delays, low power costs, minimum maintenance supplies and labor and adaptability to automatic operation are among reasons for choice of belt-conveyor haulage. Recent availability of data from a considerable number of installations makes estimating costs of conveyor haulage easy and accurate.

Added Measure—How 10 mining operations use belts, plus a 10-point check list for better results.

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This Month in Mining Practice

IN SUSPENSION—A look at contracts for new coal-drying facilities shows that fluiders and their kindred units involving entrainment or air fall are far in the lead in thermal dewatering. Among other things, this reflects the general opinion that such drying is more advantageous, as well as the further fact that the finer sizes, where such units shine the most, are a much-larger factor in industry operations today. So, pending the possible day when power plants may burn a "colloid-type" slurry directly from pipelines, fluidized drying bids fair to continue to be the leader in the fine-coal field.

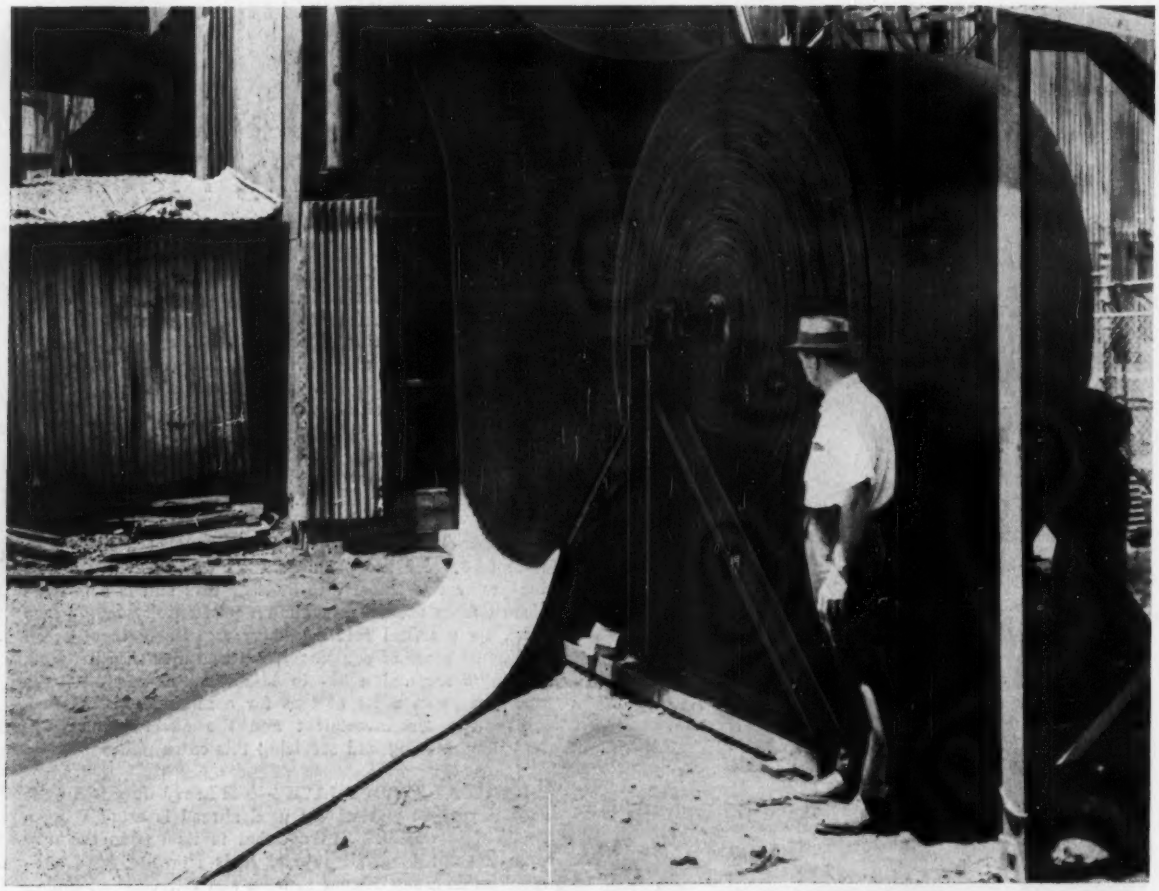
FEEDING EMPHASIS—Announcement of a new 10:1-ratio feeder for use behind shuttle cars is evidence that the problem of transfer to belts or cars still is a bothersome one in attaining maximum productivity in the face zone. Its practical solution today frequently involves an additional piece of equipment, but the difference between, say, a 15-sec and a 30- to 45-sec shuttle-car discharge rate can mean a lot of tons for a mining unit, in turn warranting the investment and the effort involved in installing, moving and servicing this extra unit.

HYDRAULIC ROOF JACKS—The heavy-duty hydraulic jack developed and widely used abroad is establishing a foothold in the U. S. In addition to its use in the new experimental longwall setups, it is showing good possibilities as a supplement to bolts and conventional timber in pillar extraction, particularly with continuous miners. Its high holding power per unit and its ability to yield when necessary are considered as especially favorable attributes in breaker service or where something more than the conventional support is desirable.

ALUMINUM UNDERGROUND—"Aluminum" until recently meant, when applied to a mine car, the body only. Now, a new car with aluminum trucks, meaning steel for only wheels, axles and couplers, has gone into service in West Virginia. So far, its predecessors of the "body-only" type are standing the gaff very well from the wear and maintenance standpoints, in addition to providing the major benefits of sharply reduced weight per ton of capacity. Consequently, the time of wider use appears to be considerably closer.

BACK IN THE RUNNING—Perhaps it should be considered that the idea of foam for fire-fighting never really lost out in the running in the U. S., though the original system did not come up to what seemed to be its potentialities. The foaming agent may have been the critical factor in view of the results that have been attained with a recently developed high-expansion type. Since fighting mine fires is a rough and hazardous business, a new and more-helpful agent is most welcome when carelessness or accident results in an ignition and consequent possibility of considerable loss of life, production loss and property damage.

US RUBBER CONVEYOR BELT



OFF WITH THE OLD, ON WITH THE NEW

20-year "U.S." veteran makes way for new "U.S." Belt

Here's why: This was a "Haul of Fame" slope belt in performance—every foot of the way. Installed in Sahara Coal Company's Mine No. 5 (Harrisburg, Ill.) over 20 years ago, this U. S. Matchless® 54" slope belt was replaced by a new U. S. Matchless.

In the 20 years, the old belt carried over 13 million tons of raw coal, plus well over a million tons of rock.

This enviable record is typical of the kind of service obtained with U. S. Conveyor Belts. The Sahara Coal Company pioneered with U. S. Rubber in the design and installation of both slope and underground belts to deliver lowest ton-per-dollar and not a belt at-a-price.

• • •

When you think of rubber, think of your "U. S." Distributor. He's your best on-the-spot source of technical aid, quick delivery and quality industrial rubber products.

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The Coal Commentator

Tops in Value

The independent laboratory is familiar to coal men as the final authority on the exact quality of a coal shipment. In the publishing business—whether newspaper or magazine including such journals as your *Coal Age*—the Audit Bureau of Circulation is the arbiter of circulation values. It makes sure that the statements of the publisher concerning who gets a publication, and how many, are the truth and nothing less than the truth.

Coal Age is proud to be a charter member of the Audit Bureau of Circulation, which the business press and McGraw-Hill in particular were the prime movers in forming in 1911. ABC makes it possible for the advertiser to know exactly what he is getting. To quote the plaque on *Coal Age's* wall: "By that action this firm joined other leading advertisers, agencies and publishers in a cooperative work of business self-regulation which through ABC changed advertising in published media from a field of speculation to one of investment founded on known values."

But what about the reader? ABC audits "paid-circulation" publications—those which ask the reader to pay a fee to get the service. This establishes a relationship not possible to achieve in any other way. Among other things, since the publisher accepts and in fact requires a fee from the reader he must strive to meet the reader's needs. Otherwise, said reader can simply cancel, leaving said publisher up a tree.

The ABC publication therefore must put the reader first. When he is put first he gets the best service possible—and as a by-product the advertiser gets the best-possible return on his outlay. In short, ABC on the masthead of a publication means tops in value to all.

Help From Oil?

Aug. 30 marked the first export of Alberta gas to the U.S. under Canadian Energy Board license. The tide will continue to rise—how high and how long is still a question. But there is no question but what such gas will give coal—and oil—at least some trouble for a time.

One reason gas can do as well as it does is that, compared to oil or coal, it is grossly underpriced at the source because it still enjoys a by-product status in valuation. Even oil is now suffering severely from this underpricing, which is the big reason why gas can compete and grow. Therefore, as indicated in the study of the oil outlook elsewhere in this issue, oil may soon join with coal in trying to eliminate the basic unfairness of competition based on by-product valuation rather than pricing on the intrinsic value.

Natural gas is no longer a by-product and the free ride it enjoys under such guise should be terminated. Oil can help, and in so doing can benefit itself as well as coal.

Go West?

Coal production in the Rocky Mountain and Pacific states totalled an estimated 10,210,000 tons in 1959. In 1929 the total was 30,322,000 tons. Oil and gas competition on the railroad, in utility and industrial plants, and in the home was the stark and simple reason. The picture would have been even worse except for the rising demands of the steel industry, which kept the metallurgical mines in business on an increasing scale.

Now, things are changing, and coal companies are going west—specifically to western New Mexico for the moment, but very likely to other areas in the future. Again the utility industry, acting on the basis of past and expected future rises in oil and gas prices—is the magnet.

An Eastern-scale industry cannot be expected in the West, but it can be accepted that the opportunities will increase, with the prospect that the West can not only recoup its losses but wind up an even bigger factor in coal than at any time in its past history.

Behind the Face

From abroad comes a report that coal operators in the Netherlands are hot-dip-galvanizing rails with zinc to get three times the life. Though traffic wears the zinc off the tops of the rails the bases, flanges and heads are protected, thus prolonging life.

Admittedly this is a detail, but details are looming up larger and larger as progress is made in raising face outputs by increased machine use and capacity. Of course this in not to infer that pressure should be slacked at the face. On the contrary. The opportunities in that area are too inviting. **But if anything involves labor for installation and maintenance, or if it offers the possibility of interruption of the coal-production stream it is well worth a share of operating attention and possibly some research investment.**

One reason for urging attention to what might seem like settled details is the fact that where such attention has been given some interesting and profitable results have been attained. Galvanizing rails might not cut overall cost a dime, say, but something else, such as mechanized ballast spreading and tamping, might.

New Ravens Tri-Axle earns $14,000 extra per year!

Extensive use of Alcoa Aluminum permits 25% bonus payload

Ravens-Metal Products, Inc., of Parkersburg, W. Va., designed and built these new all-aluminum Tri-Axle dump trailers to haul maximum coal payloads in Ohio, Michigan and Illinois. Engineered to take full advantage of lightweight Alcoa® Aluminum alloys, each weighs only 10,900 lb, yet can transport better than 50,000 lb of coal over public highways. That's a payload bonus of at least 10,000 lb over conventional steel units!

One of the units in our picture is owned by Diamond Trucking Company, of Strasburg, Ohio, whose president, Raymond Schaub, reports that 10,000 lb extra coal payload, over that possible with a similar steel unit, is being hauled on each of two daily 200-mile round trips—for an extra yearly profit of $14,000!

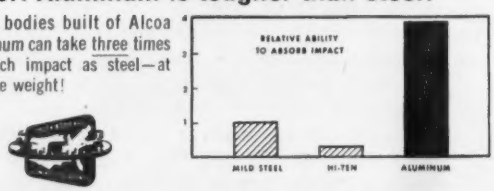
The other unit is owned by Edwards Trucking, of Dover, Ohio, and operates in the same general area. On a one-shift-per-day basis, Mr. John Edwards reports profit increases of $150 per week attributable to the all-aluminum Ravens Tri-Axle. And he adds that this figure is based only upon extra payload and does not include an added advantage that has increased his profits by a substantial, but hard to measure, amount. He finds no trouble whatever in crossing weigh scales with the Tri-Axle, whereas previously, with a wide-spread unit, his drivers had encountered a considerable amount of difficulty obtaining consistent weights from one axle to the other, so that drivers were sometimes held up at the scales as much as three hours.

Both operators point out that one of the major advantages of the Ravens Tri-Axle design is its sturdy, deep-web Alcoa Aluminum frame, permitting the unit to dump with the tractor at an angle, which could not be done with a frameless trailer. And Ravens' ingenious design, taking full advantage of the strength that can be obtained with Alcoa alloys, has produced a trailer incorporating an exceptionally strong frame with a total weight no greater than that of many frameless models.

Why not look into the possibilities for greater profit in replacing your own dump bodies and trailers with aluminum units? For the names of other operators who have enjoyed benefits comparable to those indicated above, and for your free copies of other Alcoa literature on the subject, just write: Aluminum Company of America, 1776-K Alcoa Building, Pittsburgh 19, Pa.

Proof! Aluminum is tougher than steel!

Dump bodies built of Alcoa Aluminum can take three times as much impact as steel—at half the weight!



ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

NEW CONCEPT 2 CRUSHERS IN 1

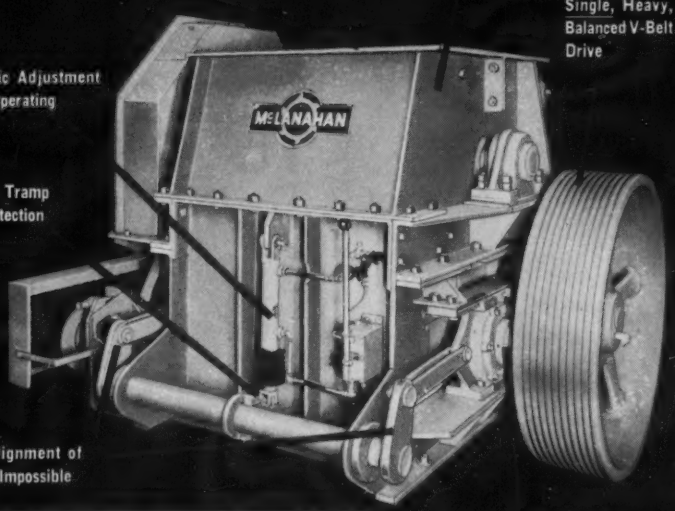
Low Headroom

Electrically Welded, Steel Frame and Housing

Single, Heavy, Balanced V-Belt Drive

Hydraulic Adjustment While Operating

Effective Tramp Iron Protection



Misalignment of Rolls Impossible

Self-Aligning Roller Bearings Throughout

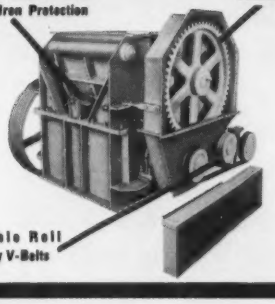
REDUCES BLOCKY RUN-OF-MINE COAL TO VARIOUS SIZES WITH A MINIMUM OF FINES

TWO-STAGE DESIGN —SINGLE-DRIVE IN A STEEL FRAME

THOROUGHLY PROVED IN NUMEROUS PLANTS

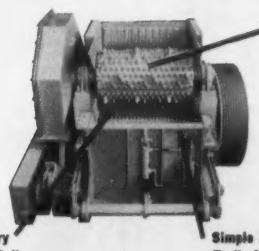
Quick Adjustment for Primary Crusher—with Tramp Iron Protection

Cut Gears in Enclosed Case



Movable Roll Drive by V-Belts

Primary Single Roll



Secondary Double Roll

Simple Assembly, Easily Accessible

Send for Bulletin TR-20

SINCE McLANAHAN 1835

TRIPLE ROLL CRUSHER

McLANAHAN & STONE CORPORATION

Pit, Mine and Quarry Equipment Headquarters Since 1835

Hollidaysburg, Pa.

NEW R/M "COALMOVER"

Hauls More
Lasts Longer
Costs Less

Compare its advantages

with any other Conveyor Belt on the Market

- **Lighter Weight for Easy Handling & Re-spooling**
- **Holds *All* Underground Types of Fasteners *Longer***
- **Solid Edge Construction Eliminates Fray & Fan Out**
- **Engineered to Haul *Either* Side—*Top or Bottom***
- ***Higher* Pulley Grip at *Lower* Tension—No Slip**
- **High Coefficient of Friction—*No* Coal Slippage as with Plastic**
- **Exclusive R/M Flexibility Over Reverse Bend & Snub Pulleys**
- **Natural Training, Easy Troughing, Full Loads in Low Headroom**
- **Maximum Resistance to Rips, Gouging and Abrasion, Impact**
- **Requires Minimum Take-up Adjustment—Low Stretch**
- **Will Not Stiffen at Low Temperature—*Not* Thermoplastic**
- **Designated "Fire Resistant, U.S.B.M. No. 28-10"**

Meet the new standard for performance in your mining operations. Let an R/M representative demonstrate the advantages you get *only* with new R/M "Coalmover" Conveyor Belt. RM 1028

RAYBESTOS-MANHATTAN, INC.
MANHATTAN RUBBER DIVISION, PASSAIC, NEW JERSEY

RM

ENGINEERED RUBBER PRODUCTS ... MORE USE PER DOLLAR

GO
with safety
for less money...

with the GALIS
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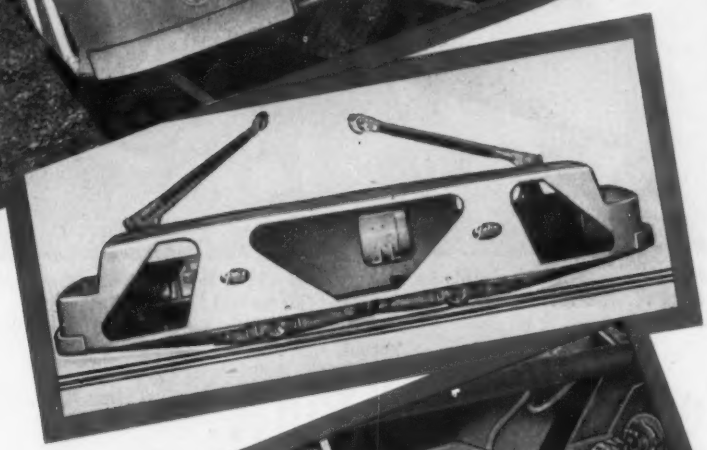
PORTAL CAR (BUS)
SECURITY plus COMFORT!



1. Dual controls and sliding hatch covers prevent exposure of operator and occupants.
2. Excellent visibility.
3. Two independent braking systems.
   a. Airplane type hydraulic service 4-wheel brakes each axle.
   b. Mechanical emergency and parking brakes.
   c. Dynamic braking, (optional at extra cost).
4. In-built rugged frame protects personnel.
5. Soft coil springs and shock absorbers provide unusual riding comfort.
6. Tail lights, stop lights, horn, defrosters, wipers are appreciated safety features, mechanical pole retrievers are also available at cost.
7. Stretcher space always ready.

Clip and mail

Please send complete specifications — GALIS BUSMASTER PORTAL CAR

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Galis
ELECTRIC & MACHINE CO.
MORGANTOWN, W. VA.

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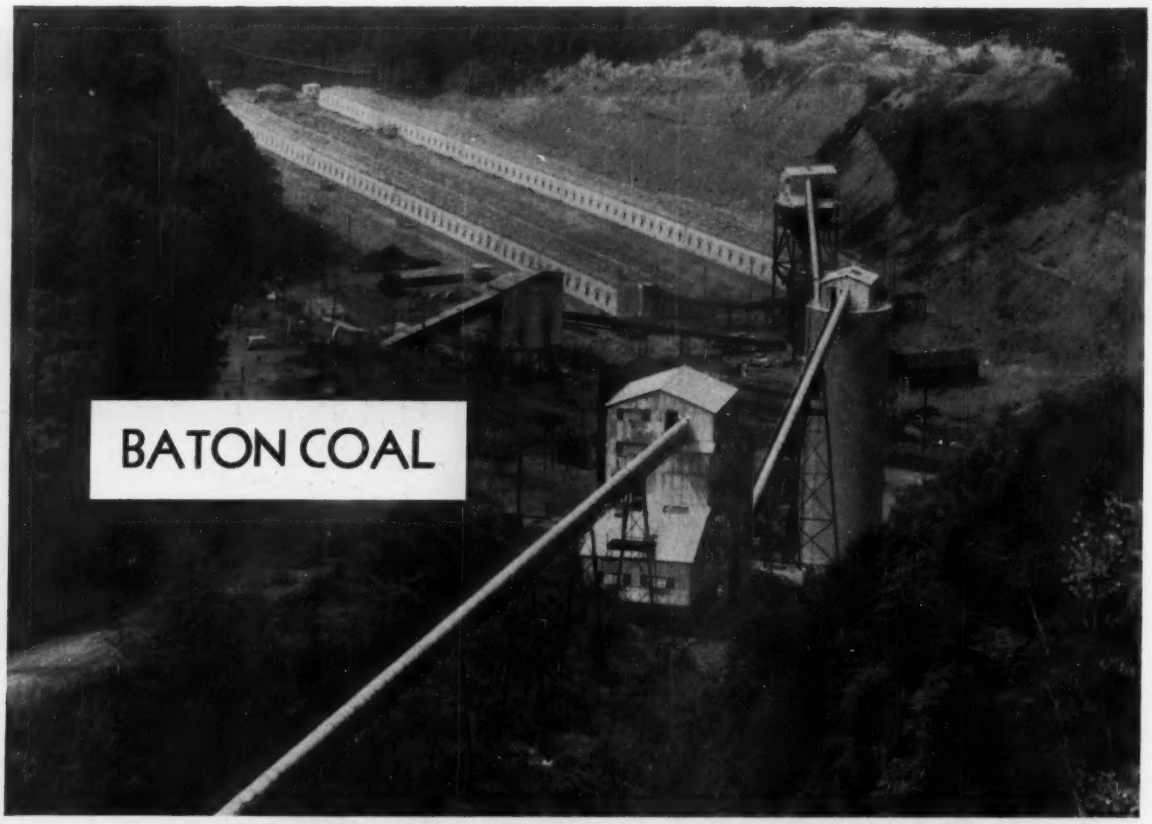
Remember Galis for repairing and rebuilding all underground equipment.



Carpentertown Coal & Coke Company's Mahoning Mine Preparation and Handling Plant for 180 TPH ROM Coal: H & P Heavy Media Washer, H & P Cyclones, Reineveld Coarse and Fine Coal Dryers, H & P Sieve Bends, Wet Concentrating Tables, Vacuum Filter.

From Raw Coal Hopper to Larry Bin...

it's H&P all the way!

The Baton Coal Company, operating the Carpentertown Coal & Coke Company for Sharon Steel, demands efficient operation and a quality product. These conditions governed H & P's design of the new Mahoning Coal Preparation and Handling Plant, processing 180 TPH of Upper Freeport Seam into a metallurgical coking coal which contains 80% of minus ⅛".

For coarse coal and fine coal preparation, H & P has provided only the newest proven equipment and methods, including:

For efficient coarse coal washing—the New H & P Heavy Media Washer
For economical dewatering —the H & P Sieve Bends
For troublefree thickening —the H & P Cyclones
For high-capacity drying —the Reineveld Centrifuges

The plant, from Raw Coal Hopper to Larry Bin, was designed, built and completed on time and H & P's performance has confirmed to this customer what many others already know:

When Experience Counts—Count on Heyl & Patterson.

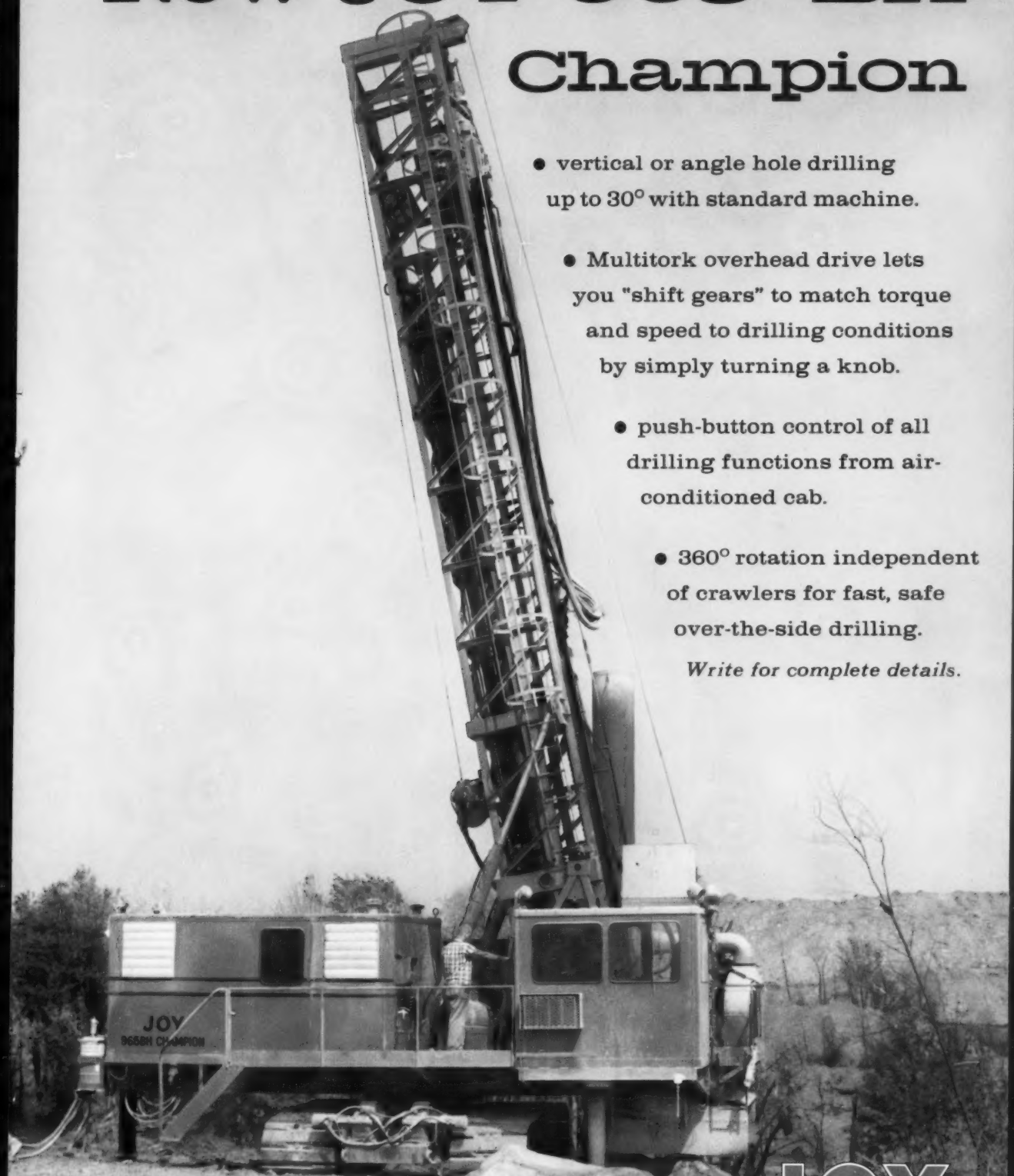
HEYL & PATTERSON, inc.

55 FORT PITT BLVD., PITTSBURGH 22, PA. • COurt 1-0750

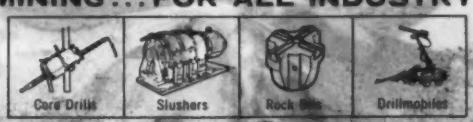
New JOY 965-BH Champion

- vertical or angle hole drilling up to 30° with standard machine.
- Multitork overhead drive lets you "shift gears" to match torque and speed to drilling conditions by simply turning a knob.
- push-button control of all drilling functions from air-conditioned cab.
- 360° rotation independent of crawlers for fast, safe over-the-side drilling.

Write for complete details.



EQUIPMENT FOR MINING... FOR ALL INDUSTRY



JOY

Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.
In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario

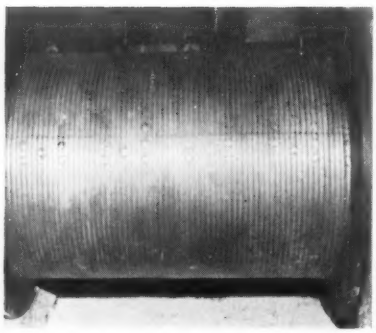
2328

Introducing a new service to the Mining Industry!

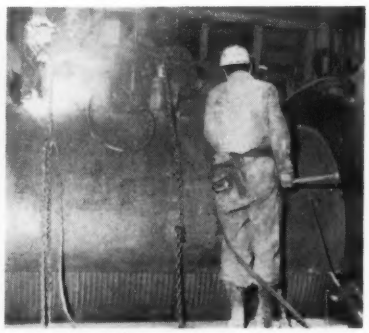
RESTORE WORN DRUMS

WITH LEBUS GROOVING

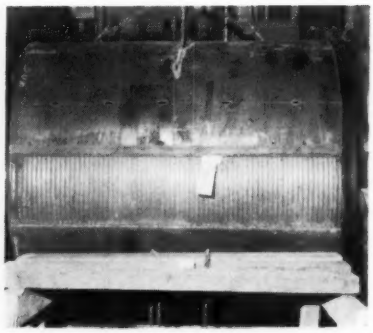
Here is one of several methods available for restoring your worn drums by the LeBus Spooling System, either on cast iron or steel drum. Wire line size may be changed in the same operation. Photos below show installation of LeBus Spooling System on a helical grooved steel drum.



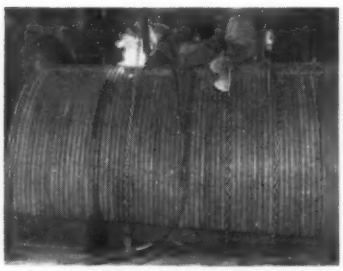
(1) Shows a 60" by 90" helical grooved steel drum before installation of LeBus Counterbalance Spooling System.



(2) Installation of one-half of steel split sleeve being welded and bolted over old drum core.

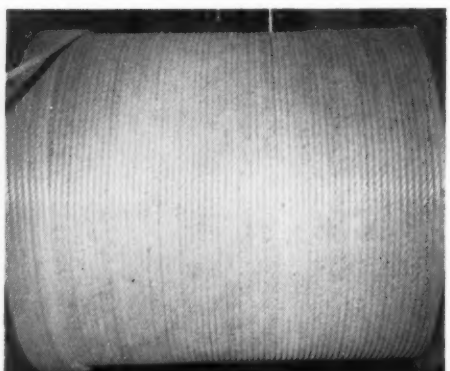


(3) Second half of steel split sleeve being put in place before welding to drum core.



(4) Installing LeBus grooved segments over steel split sleeve by method of welding firmly to the drum.

(5) View of completely restored drum being finished by grinding welds smooth in preparation for spooling the line on drum.



(6) Showing 8500 feet of 1-¼" wire line being spooled on seventh layer successfully and safely by LeBus Counterbalance Spooling System.

LEBUS

LEBUS INTERNATIONAL ENGINEERS INC.

Box 2352, Longview, Texas **Phone: PLaza 8-5522**

See movies of these operations at LeBus Booth, Las Vegas Mining Show October 10th to 14th

Fairmont Machinery Company
P. O. Box 992 Telephone: 1672
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Salmon and Company
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Grand Junction, Colorado

Western Machinery Company
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NOW!

A belt feeder that will increase production by . . .

1. Receiving any shuttle car load in 15 seconds
2. Feeding the belt at any desired rate
3. Eliminating bottlenecks in multiple belt operations
4. Substantially reducing belt maintenance cost
5. Increasing belt conveying efficiency

The *Positive Performance* Jamison Belt Feeder—a new concept in material transportation—gives you more profit dollars from your mining operation. Engineered, developed and proven by Jamison, the *Positive Performance* belt feeder makes increased production at lower cost a reality.

Simplicity of design permits virtually maintenance-free operation, and labor costs are cut substantially through reduced belt maintenance.

Shuttle cars can discharge continuously into the system, which has no maximum input limit. Output is easily regulated; the reduction ratio is limitless and can be tailored to your specific needs.

For detailed information concerning the applications of the *Positive Performance* Jamison Belt Feeder for your mining operations, write today.

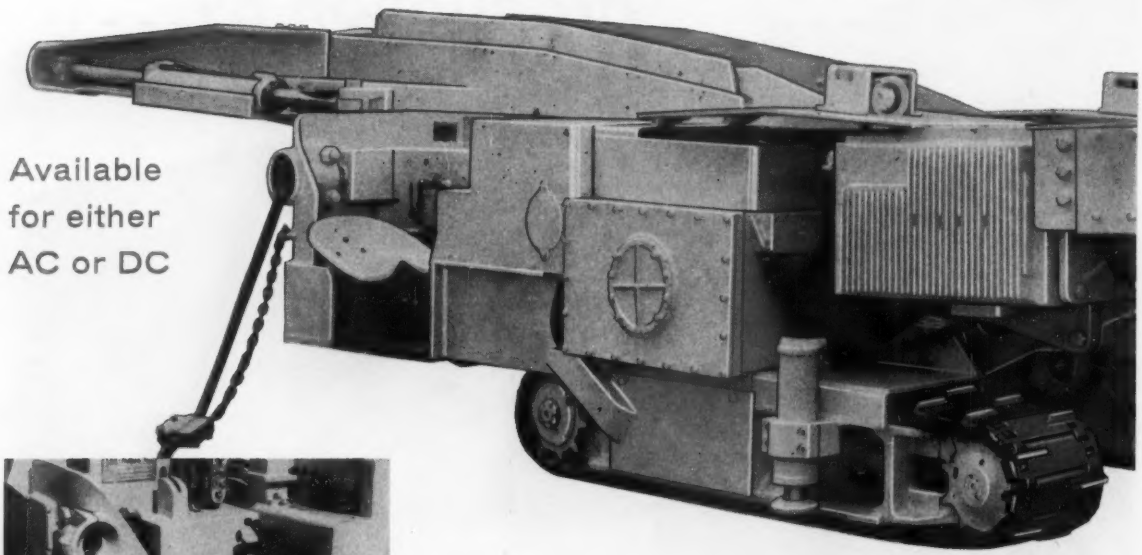
JF

HUNKERS, PENNSYLVANIA

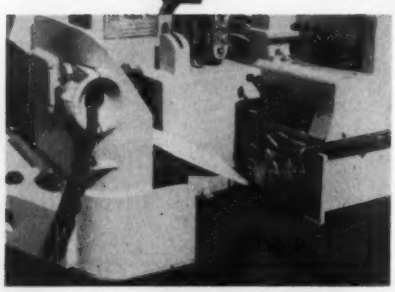
JAMISON FEEDER, INC.

TELEPHONE: WAlker 5-7200

LIGHTWEIGHT COST *plus* HEAVYWEIGHT *equals* PRODUCTION



Available for either AC or DC



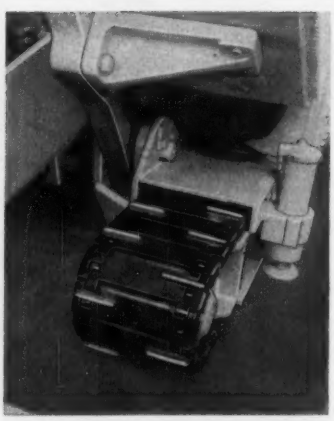
OPERATOR'S PLATFORM

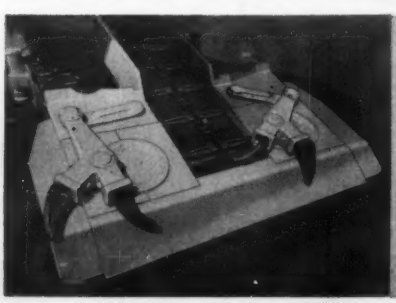
Compact and convenient hydraulic and electrical controls are within easy reach of the operator. Throttle valve precisely controls the speed of all hydraulic operations as well as providing "deadman" control.

16″ WIDE CRAWLER

The new crawler with heavy-duty gearing can operate the miner on steep grades and also float on soft bottom.

Less than 25 P.S.I. ground pressure.



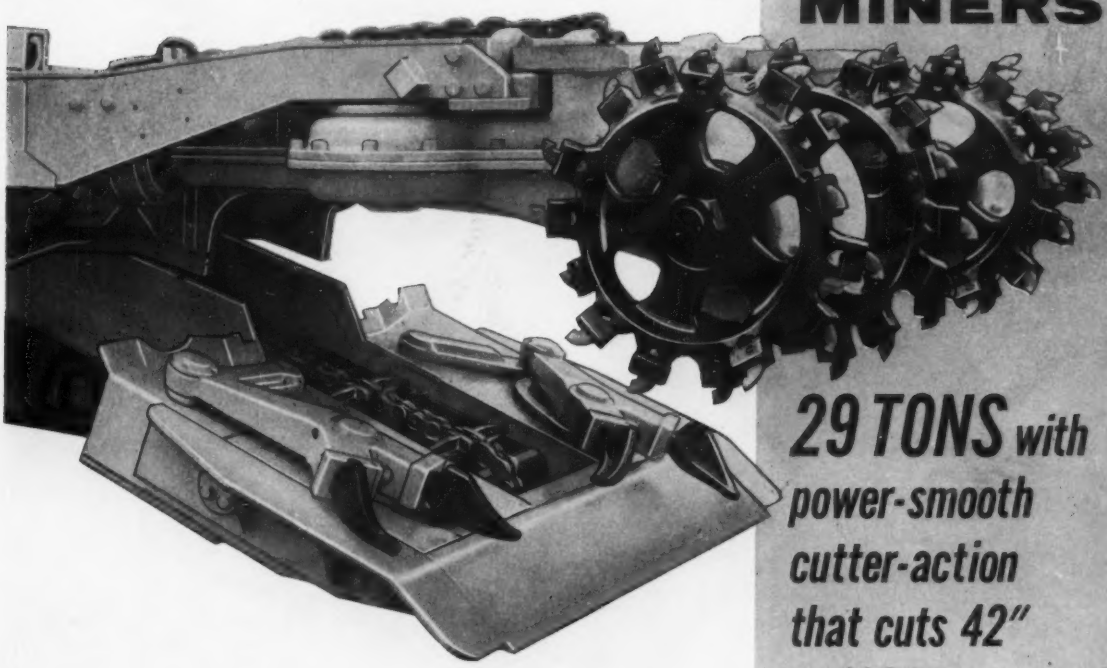


GATHERING HEAD

The exclusive "dual gathering arms" provide maximum reach and much better flow to the conveyor.

PERFORMANCE PUNCH

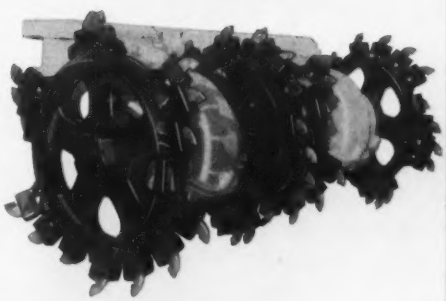
Lee-Norse CM38 and CM48 MINERS



29 TONS with power-smooth cutter-action that cuts 42" to 120" seams and gathers loads as fast as they are cut

CUTTING HEADS

New "Rap-Lok*" Cutter Bits, spaced evenly around cutter rim, provides smooth, vibrationless performance. Extremely quick "bit change"—no set screws—long bit life.



*Trade Mark of The Cincinnati Mine Machinery Co.

Lee-Norse Company

CHARLEROI, PENNA.

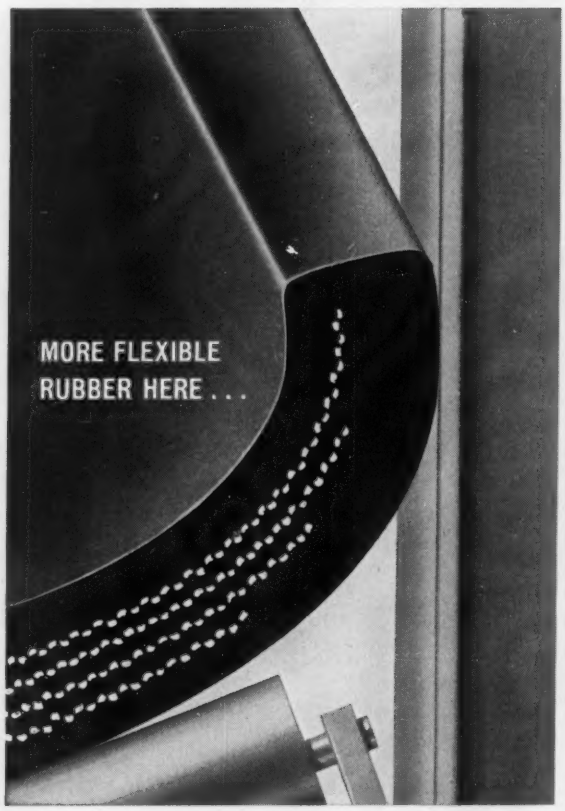
Specialists in Coal Mining Equipment

Coal high or low?... Lee-Norse MINERS keep production on the go!

Quaker Thermoid

"COLEDGE" BELTING

REDUCES EDGE WEAR, ADDS MILES OF USE!



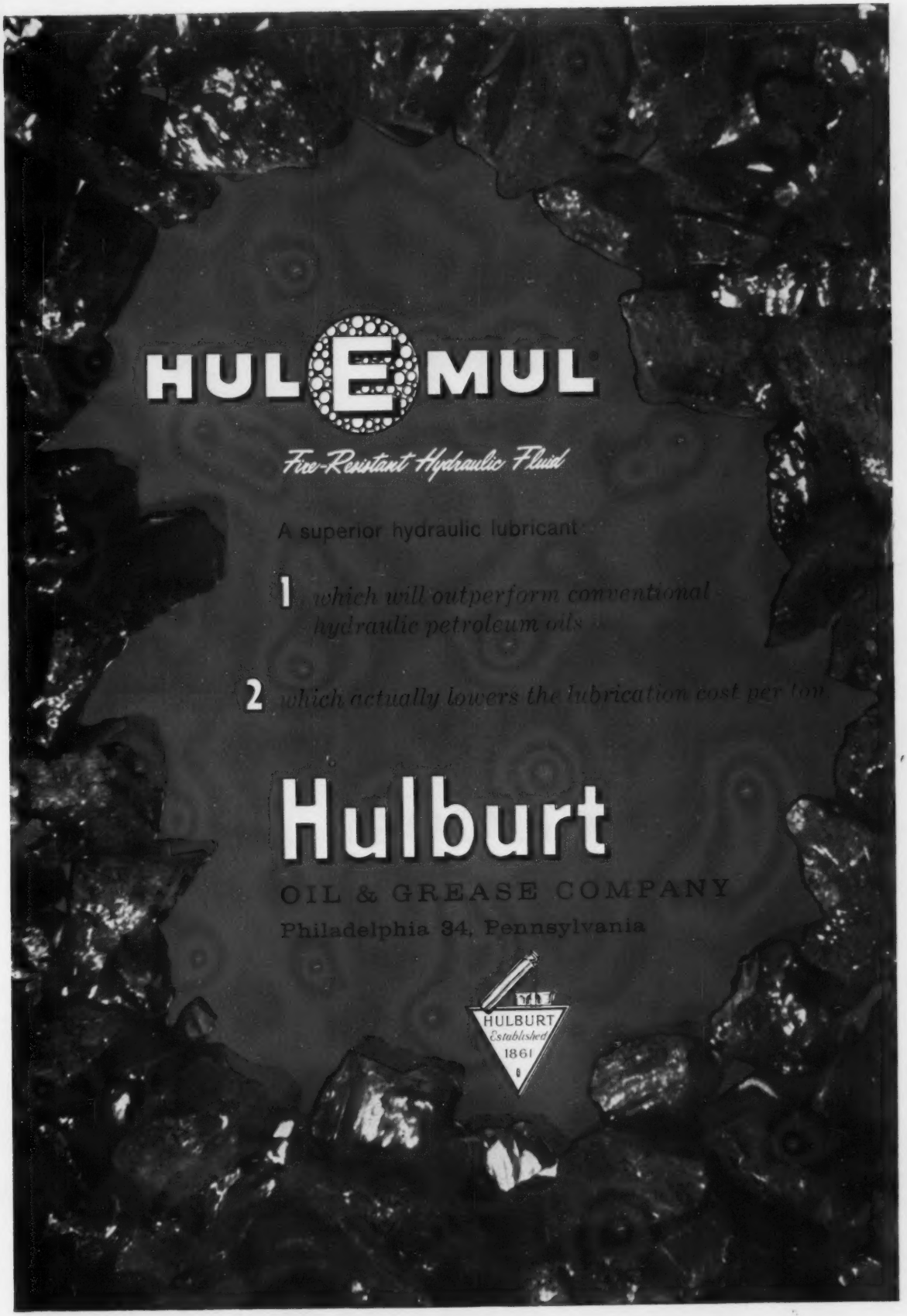
Improper training can ruin a conveyor belt faster than any other abuse. Riding up and rubbing against a frame member soon wears away the stiff edge of conventional belting and exposes the carcass plys to moisture, mildew, dirt and eventual ply separation. "Coledge" belt construction was developed by Thermoid Division—to overcome this weakness and extend belt life.

"Coledge" construction puts plenty of extra rubber on the edges where it counts most . . . the plys are stepped back to make a more flexible edge that rides with the punches when misalignment occurs. This "Coledge" construction can put many extra miles on your system, especially in coal fields and sand and gravel pits where most belt failures are the result of excessive edge wear. Exclusive with Thermoid Division, "Coledge" construction is available in any standard type belt your application may require.

So, if you have an edge-wear problem with conveyor belts, specify "Coledge" construction. See your Thermoid Division industrial distributor for technical data or assistance, or write *Thermoid Division, H. K. Porter Company, Inc., 200 Whitehead Road, Trenton 6, New Jersey.*

THERMOID DIVISION PORTER **H. K. PORTER COMPANY, INC.**

PORTER SERVES INDUSTRY with steel, rubber and friction products, asbestos textiles, high voltage electrical equipment, electrical wire and cable, wiring systems, motors, fans, blowers, specialty alloys, paints, refractories, tools, forgings and pipe fittings, roll formings and stampings, wire rope and strand.


HULEMUL
Fire-Resistant Hydraulic Fluid
A superior hydraulic lubricant
1 which will outperform conventional hydraulic petroleum oils
2 which actually lowers the lubrication cost per ton
Hulburt
OIL & GREASE COMPANY
Philadelphia 34, Pennsylvania
HULBURT
Established
1861

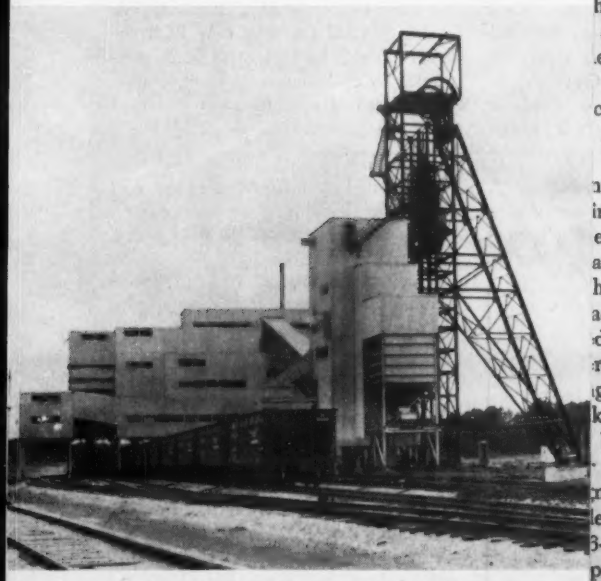
America's Newest Major Coal Mine

(Its Continuous Borers and ROPEBELT® *Conveyors—all by Goodman)*

Typical scene at Old Ben Coal Company's new No. 21 mine near Sesser, Illinois. Coal is carried by Goodman ROPEBELT Conveyors. 36 inch units traveling 450 feet per minute are used in the panels. Goodman 42 inch units, traveling 600 feet per minute, are used for the mainline.

® *Registered trademark*

Goodman Continuous Borers are being used for all development work now and full production work later. The borers develop an arched entry 7 feet high and 13 feet wide. Capacity of each Borer is 8 to 10 tons per minute.



In this new preparation plant, Old Ben No. 21 employs both wet and dry cleaning to produce low-sulphur metallurgical coal. The product will meet the growing needs of the Midwest's expanding steel industry, as well as those of utilities, factories, and domestic users.

Excerpts from coal industry's leading publications

RESULT OF FORESIGHT

Old Ben No. 21, newest major deep-shaft coal mine in Illinois, is located in a 100-million ton reserve of metallurgical coal acquired in 1918 in anticipation of demands of today's industrial markets. With a potential capacity of 15,000 tons per day, it joins the ranks of the nation's largest producing mines.

HOW COAL IS MINED

Coal is mined with Goodman Continuous Borers which develop an arched entry 7 feet high and 13 feet wide in the 9 foot seam. Maximum capacity is 8 to 10 tons per minute. Like all production machines in the mine, the Goodman Continuous Borers employ 440-volt a-c power. Two 100-hp motors power the twin cutting arms, and a 50-hp motor powers the tramming and hydraulic systems. *When the mine is in full production, eight Goodman Continuous Borers will be in use.*

Each continuous borer is served by three shuttle cars, with a capacity of eight tons per car.

HAULAGE SYSTEM

The shuttle cars discharge to 36 inch Goodman ROPEBELT Conveyors, unloading over either the sides or end of the conveyor, whichever is most convenient. The 36 inch conveyors discharge to the 42 inch ROPEBELT conveyors of the main haulage system.

An interesting feature of this Goodman conveyor system is that most units are suspended from the mine roof rather than being mounted on supports on the mine floor. This is because of the weak nature of the seam floor, which tends to "heave" following extended exposure and weight.

Originally it was planned to suspend only the main 42 inch belts in this fashion, but the success of the method, coupled with better self-alignment of bottom idlers because of freedom to swing and thus train automatically, plus the speed of installation, caused management to employ the same method with the 36 inch conveyor units.

The conveyors are suspended from 5 foot roof bolts. Use of a special sliding bearing plate and hanger on these bolts make perfect alignment of the support bolts unnecessary, as the plates can be adjusted within a range of six inches as necessary when installing and aligning the conveyor.

This is mining's new look aboveground and underground. Let us arrange for you to see Old Ben's No. 21 in action.

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News Roundup

When Coal Men Get Together

The board of directors of the National Coal Association met Sept. 21, in the new Washington, D. C., coal building, and approved subsidiary Bituminous Coal Research's plans to build a central research laboratory at Monroevill, Pa. The gathering included: (standing left to right) **H. C. Woods,** chairman, Sahara Coal Co.; **H. St. Clair,** president, Jewell Ridge Coal Corp.; **N. E. Kelb,** president, Ayrshire Collieries Corp.; **S. A. Caperton,** president, Slab Fork Coal Co.; **J. T. Berta,** executive vice president, Clinchfield Coal Co.; **W. S. Webster,** president, Snow Hill Coal Corp.; **D. W. Buchanan Jr.,** president, Old Ben Coal Corp.; **G. A. Shoemaker,** president, Consolidation Coal Co.; **M. Eastin Jr.,** president, West Kentucky Coal Co.; **H. P. Junod,** partner, Pickands, Mather & Co.; **G. Bonnyman,** president, Blue Diamond Coal Co.; **S. F. Sherwood,** president, Stonefort Coal Mining Co., Inc.; **J. R. Maust,** president, Maust Coal & Coke Corp.; **H. LaViers,** president South-East Coal Co.; **G. E. Owen,** chairman, Imperial Coal Corp.; **R. H. Knode,** chairman, Stonega Coke & Coal Co.; **C. R. Griffith,** president, Southern Coal & Coke Co.; and **J. L. Kemmerer Jr.,** chairman, Wise Coal & Coke Co. Seated (left to right) are: **F. Nugent,** president, Freeman Coal Mining Corp.; **R. L. Ireland,** chairman, executive committee, Consolidation Coal Co.; **F. S. Elfred,** chairman, Peabody Coal Co.; **D. L. Francis,** president, Princess Coals, Inc.; **G. E. Enos,** president, Enos Coal Mining Co.; **S. F. Dunn,** NCA president; **H. E. Jones,** chairman Amherst Coal Co.; **L. N. Thomas,** president, The Carbon Fuel Co.; and **H. V. Fritchman,** executive vice president, Rochester & Pittsburgh Coal Co. The new BCR research lab will be built with funds contributed by coal companies, electric utilities, equipment manufacturers and coal industry suppliers.

Tough Competition

Western Kentucky has emerged as a major competitor of Tennesse coal producers in the wake of reduced Louisville & Nashville R.R. freight rates on rail shipments from west Kentucky coal fields to the Widow's Creek steam plant.

The reduction, announced in a TVA letter to coal producers, slashed shipping costs from $2.69½ a ton to $1.55 on a graduated scale ultimately reaching a bottom rate of $1.40 a ton.

The rate cut brought immediate protests from southern Tennessee miners and coal producers, who claim the reduction "is a scheme aimed at lowering the prices of coal and will, in effect, close down Tennessee mines and displace Tennessee workers."

In turn, TVA officials claim the agreement with the railroad made possible the second 500,000-kw generator which will be installed at Widow's Creek near Bridgeport, Ala. They said also it opened an estimated 3 million-ton-a-year coal market for both southern and eastern Tennessee and western Kentucky coal producers.

Southern Tennessee coal producers contend the lowered freight rate, plus cheaper mining production coasts available to west Kentucky miners, will enable west Kentucky producers to underbid Tennessee producers on contracts for the Widow's Creek plant.

Paul Evans, TVA information director, said southern Tennessee producers enjoy advantages of lower haulage rates and 10% higher quality coal, an important factor, since TVA coal contracts are let on basis of Btus per pound of coal.

"We buy the cheapest coal on the basis of competitive bids offered by producers," Evans said. "It's up to individual producers what their bid is—we don't fix prices. The differential (be-

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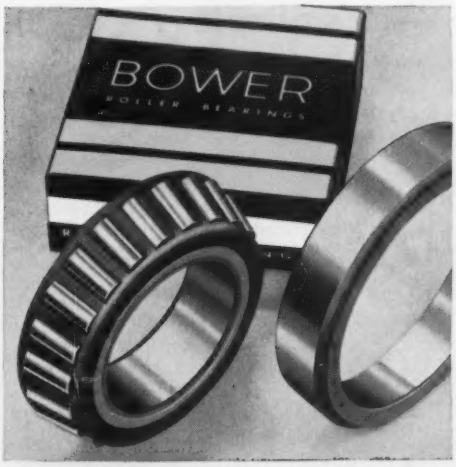

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tween Tennessee and West Kentucky producers) that existed previously has narrowed, but southern Tennessee miners are still favored as far as freight rates are concerned."

Tennessee producers pay only 60 to 65c a ton for haulage to the Widow's Creek plant, but contend their actual overall production cost is higher than west Kentucky, due to union costs, smaller seams, underground mining and mountainous locations.

Representatives of southern Tennessee producers took issue with Evans' statement of "no price fixing" and conferred at length with attorneys over the prospect of initiating legal action against the rate decision.

"Legal action is not unlikely, but it is too early to tell what steps might be taken," said W. W. Glenn, traffic manager for Tennessee Products & Chemical Corp.

"We cannot bid as low as west Kentucky can with the lower freight rate because it costs us more to produce coal than it does west Kentucky. With all the economies we could think of putting in we still couldn't meet their bids. Legal action depends on determining if TVA is a government agency and if it is empowered to set prices."

TED KELCE (right), Peabody executive vice president, presents Russell Kelce Safety Trophy to Howard Frisbie, superintendent, Bee-Veer mine.

Safest of All

Bee-Veer mine, Macon, Mo., achieved the best safety record of all Peabody Coal Co. mines for the 12-mo period ended June 30, 1960.

The mine was the recipient of the Russell Kelce Safety Trophy and Peabody Safety Flag at a banquet held August 29. Ted L. Kelce, executive vice president, made the formal presentation of the trophy to Howard Frisbie, Bee-Veer superintendent.

The trophy, a gold cup, is presented by the firm in honor of the memory of the late L. Russell Kelce, former president of Peabody. The banquet was attended by all Bee-Veer employees, several guests and a number of Peabody officials and department heads from the firm's general office in St. Louis.

E. E. Quenon, Peabody director of safety, explained the firm's safety program and congratulated the Bee-Veer management and employees on their outstanding achievement. He announced that during the 12 mo, the mine had only one lost-time injury, and in that case the injured worker lost only six days of working time.

Mr. Kelce, in presenting the trophy, emphasized the importance of the safety program. He said, "Russell Kelce, my brother and our former president, throughout his life recognized that the company's people represented its most valuable asset and that their safety and well-being must always be a primary concern of the company's management."

Standout Team

Compass No. 1 mine, of Clinchfield Coal Co., Div. of Pittston Co., won top honors in the annual Beckley, W. Va., first-aid contest, held August 20.

The team, from Barbour, W. Va., already held the national and state championship. It faced an experienced group of 32 first-aid teams. Dale See is team captain. Other members are Ernest Collins, Audrey Collins, Manuel Cabo, Frank Elmond, Bruce Jones and Calvin Haller.

Each of the teams in competition worked on four problems. All problems involved giving first-aid to workers in make-believe accidents in mining. Trophies went to the teams finishing from first to fifth, as follows: second, Harewood (white) team; third, Itmann team, Pocahontas Fuel Co.; fourth, Gary No. 3, U. S. Steel Corp.; fifth Harewood (Negro) team. The two Harewood teams are sponsored by the Semet Solvay Div., Allied Chemical & Dye Corp.

The contest climaxed a successful "Miner's Day" celebration in which a safety day queen was crowned, a talent winner discovered and a "miner of the year" selected. The activities were sponsored by the Coal Operators, United Mine workers of America, and the Beckley chamber of commerce, with Joshua Smith, Eastern Gas & Fuel Associates, general chairman.

It's Simple

Introduction of a new practice to the coal industry—"work simplification"—has been cited by R. P. Tibolt, president, Eastern Gas & Fuel Associates.

Speaking at a luncheon and graduation exercise for 90 supervisors of the firm's Wharton No. 1 and 2 mines, Boone County, W. Va., who had just completed what was believed to be West Virginia's first miner work simplification course, Mr. Tibolt discussed the values of the new idea.

He said, "Work simplification is another way being used to continue our Coal Div.'s constant and long-range effort to reduce production costs. Your work simplification ideas are part of the way we're trying to remain competitive and make the jobs of our employees more secure."

Work simplification, it was pointed out, is a modern management technique which helps individual supervisors develop better, more efficient ways of doing the work assigned to them. Eastern

(*Continued on p 54*)

This Red Rubber is a better rubber for runners pumping abrasive pulps because it has...

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This abrasive resistant stock is standard on all runners for DENVER SRL and SRL "Tru-Glandless" Pumps (sizes to 10" x 8"). Other polymers are available for applications involving high temperatures, oils or acids where abrasion is a secondary problem.

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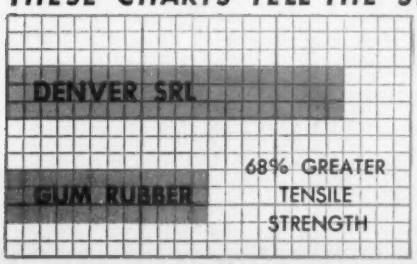

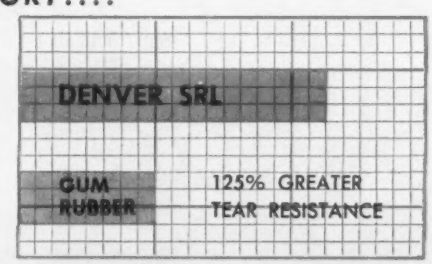

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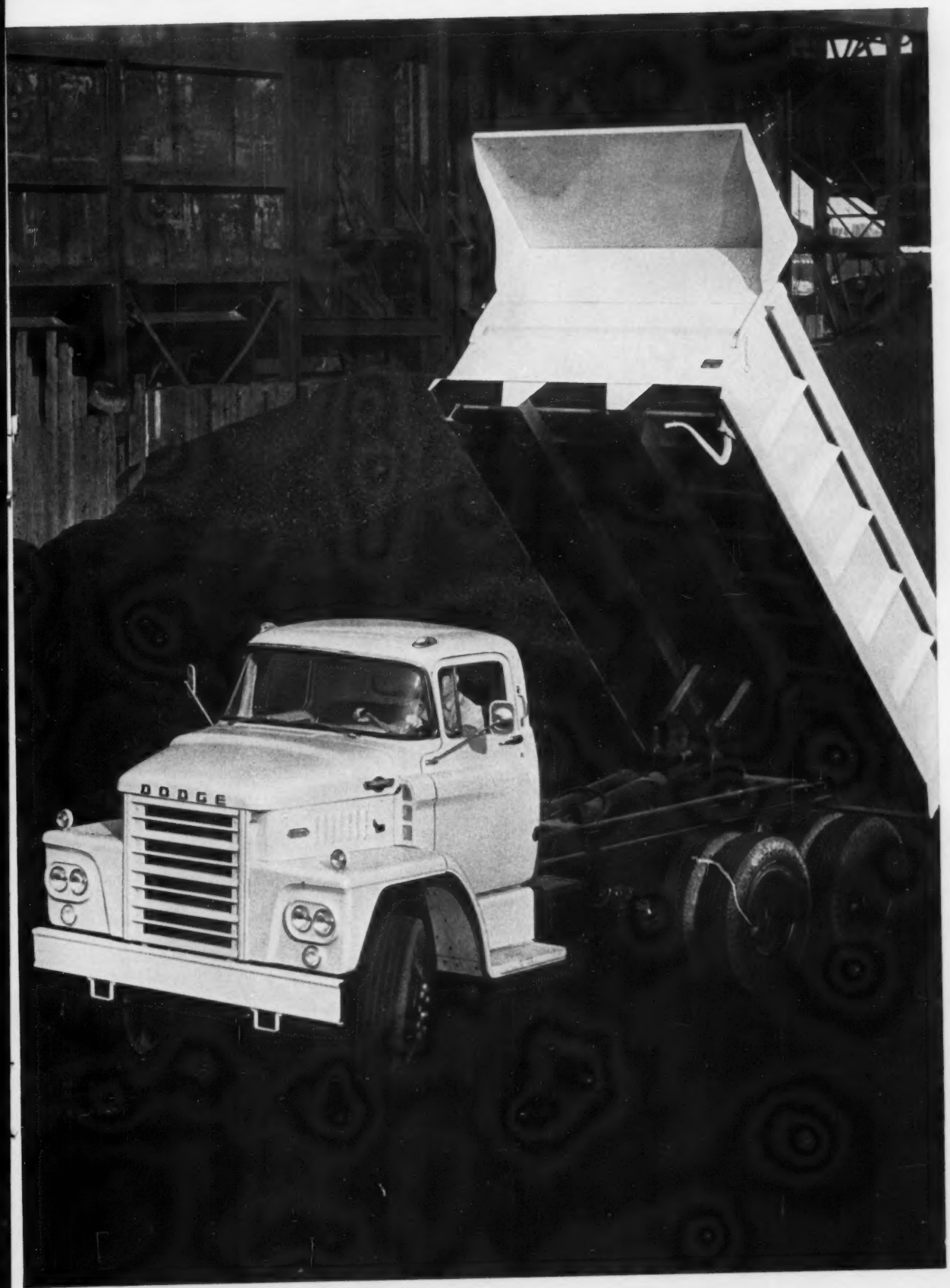
DODGE

People in Coal

Top Man at P&M

ARNOLD E. LAMM, 52, former president and owner of the Sunnyhill Coal Co., is the new president of Pittsburg & Midway Coal Mining Co., succeeding Edwin R. Phelps, who has resigned.

In Mr. Lamm, P&M, subsidiary of Spencer Chemical Co., Kansas City, acquires a man with broad experience in the coal industry. He began his career in 1936 as comptroller for United Electric Coal Cos., and was later elected secretary-treasurer of that firm. With United Electric, he not only established new accounting and finance procedures but also helped initiate modernization programs. He also participated in the conception and design of new earth-moving equipment for strip mining.

Beginning in 1946, he guided Sunnyhill Coal Co., Ohio, to a position of leadership in the industry, with annual production in 1959 of 1½ million tons. At Sunnyhill, acquired last year by Peabody Coal Co., he helped design and is one of the principal patent holders of the Colmol—a rotary-type continuous mining machine for deep mining.

Mr. Lamm is a native of Freeport, Ill., and a graduate from the University of Wisconsin. In 1930, just after graduation, he joined the Wisconsin State Tax Commission as an auditor and shortly thereafter became a certified public accountant before beginning his career in the coal industry.

Frank W. Earnest Jr., has stepped down from the presidency of the Anthracite Institute to take over the post of executive vice president of the chamber of commerce of Wilkes-Barre, Pa. Mr. Earnest, in making the change, accepted what amounted to a draft by many leading businessmen, labor and civic leaders, to use his newly-created office to spearhead and accelerate action on the industrial front. Mr. Earnest has been associated with the anthracite industry since 1936, and during his tenure of office as the institute head, was in charge of large industry advertising and promotional research campaigns.

Replacing Mr. Earnest as president of the institute is **John D. Jillson,** former vice president of the organization. Mr. Jillson has been with Anthracite Industries, Inc., and the Anthracite Institute since 1938, serving as secretary-treasurer before becoming vice president. He was an industry representative in Washington, D. C., during the Korean war, from 1950 to 1953. He is a resident of Huntsville, Pa., and a graduate of Amherst College.

Harry Martin Tibbs has been promoted from assistant to the president of Truax-Traer Coal Co., to vice president in charge of operations. Mr. Tibbs got his early training in mining operations with the Hardrock mine, near Helena, Mont. Immediately prior to World War II, while assistant director of the Montana Employment Service, the government appointed him regional director of the War Manpower Employment Service, with headquarters in Denver, where he served until 1945 when he was named director of employment for the Union Pacific Coal Co., in Montana. In January, 1953, Truax-Traer appointed him manager of their Western Div., in which capacity he served until his appointment as assistant to the president in 1959.

Walter Robertson has been named vice president, operations, for Harmon Creek Coal Corp., western Pennsylvania strip mining company. The firm also named **James R. Wilson** as vice president, sales. Mr. Robertson, former mine superintendent, has been with Harmon Creek for 34 yr. He has been responsible for the vast reclamation and reforestation program on the company properties near Burgettstown. He is a member of the board of Mellon Bank's Burgettstown branch. Mr. Wilson was sales manager for Harmon Creek, which he joined in 1951. He is a director of the Western Coal Operators Association.

Jesse O. Williams, chief engineer, Hart & Hart Coal Co., Providence, Ky., was reelected president of the Kentucky Reclamation Association at their annual meeting held recently. Other officers reelected were **O. E. May,** Pittsburgh & Midway Coal Mining Co., vice president; **G. N. Ranney,** Riverview Coal Co., secretary-treasurer; and **Mrs. Elinor Rich,** assistant secretary-treasurer. Elected to serve on the board of directors were: **Jesse Williams,** chairman; **O. E. May** and **G. N. Ranney; James A. Miner,** Pittsburg & Midway; **C. V. Jordan,** Ruby-Chandler, Jordan Co.; **Russell Badgett Jr.,** Russell Badgett Jr. Coal Co.; **Bradley Sparks** and **James Deane,** Peabody Coal Co.; **C. W. Boone,** Laurel Mountain Coal Co.; and **R. H. Swallow,** Gibraltar Coal Corp.

Carl A. Peterson, vice president and general manager for Northwestern Mining & Exchange Co., announced his resignation from that company, with the intention of entering the private consulting field. Under Mr. Peterson's management, the company was successful in mechanizing its mines and entering the commercial coal market on a full scale.

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4. Non-corrosive to coal handling equipment. No costly wearing out of handling equipment occurs when you use STANDARD Coal Spray Oils. There's no down time for repair and replacement of equipment.

5. Three valuable product benefits. (1) A clean, dustless product to sell. (2) A good, bright appearance to your coal after spraying. (3) Reduced windage losses in shipment.

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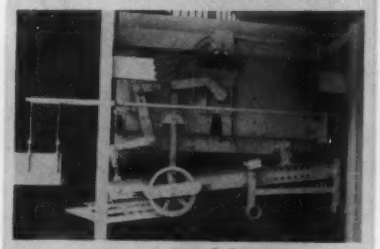

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People in Coal (Continued)

FIRST SECRETARY of the National Coal Association, J. D. A. Morrow, meets with Stephen F. Dunn, first paid president of the organization, in the new Coal Building in Washington, D. C. Mr. Morrow, former president of the Pittsburgh Coal Co. and president and board chairman of the Joy Mfg. Co., was in Washington to consult with Smithsonian Institute officials on their plans for a coal industry exhibit at the new Museum of History and Technology. NCA is cooperating with the institute on the project.

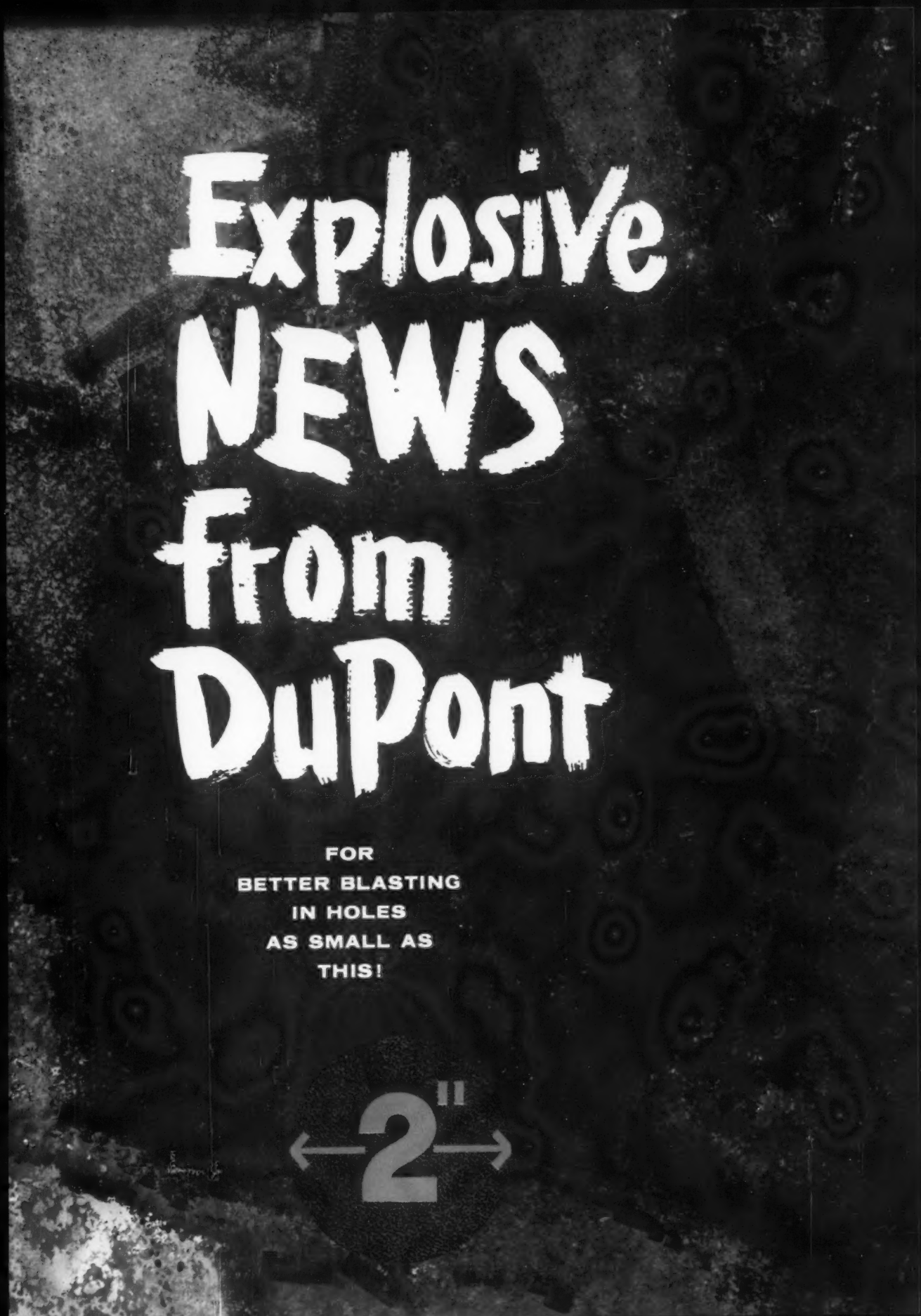
Alabama By-Products Corp., Birmingham, Ala., announced that the board of directors had established a single Operating Dept., to include a Coke & Coal Chemicals Div., a Coal Mining Div. and a Technical Control & Research Div. The department will be headed by **H. J. Hager,** former vice president, mining operations. As vice president—operations, Mr. Hager will be responsible for achieving better coordination of the firm's mining and manufacturing operations. **Homer Gardner** will continue as vice president, coke and coal chemical operations and **G. C. Dyar,** former general superintendent of mines, was elected vice president, coal mining operations. **W. M. Mobley** will continue as technical director and **W. E. Self** has been appointed general superintendent of mines.

Changes in the Bureau of Mines headquarters units in Washington have affected the Divs. of Minerals, Bituminous Coal and Petroleum. The changes were made to facilitate management of research. The realignment in the Coal Div. leaves the staff as follows: **T. Reed Scollon,** Div. chief; **Harry Perry,** assistant chief; **William L. Crentz,** assistant to the chief; **Raymond W. Hiteshue,** chief, Branch of Bituminous Coal Research; **Glenn H. Damon,** chief, Branch of Explosives Research; and **Thomas W. Hunter,** chief, Branch of Bituminous Coal Economics.

Obituaries

Eric Mitchel, vice president in charge of operations of the Pennsylvania Coal & Coke Divs., Fairbanks Whitney Corp., died Sept. 5 at the age of 60. Mr. Mitchel, who had long experience in the field of coal mining management, both in Europe and the United States, was born in Breslau, Germany, and received a Ph. D. from the University of Munich. He came to the United States in 1938, and before joining Fairbanks Whitney in 1951, was vice president in charge of operations for the Simpson Creek Collieries Co.

B. B. Housman, secretary of the Smokeless Operators Associations, Bluefield, W. Va., passed away recently. He spent 43 yr with the Pocahontas Operators Association, which merged in 1959 with the Winding Gulf Operators Association, to become the Smokeless organization. Born in Galax, Va., he later moved to Carroll County, Va., coming to Bluefield in 1916. He was educated in Virginia schools and was the first director of the Southern Appalachian Industrial Exhibit, more familiarly known as the Bluefield Coal Show. Other associations included the Pocahontas Electrical and Mechanical Institute, the West Virginia Coal Mining Institute and the University Club of Bluefield. Mr. Housman was active in most of these.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You don't mix "Nilite" 101 on the job. You don't mix it at all. Just rip open the bag and pour it into any hole —small, medium, large—from 2″ diameter up. No clogging, no bridging in the hole.

No clouds of dust, and no ingredient to cause headaches. Ask the men on the blasting crew how they'd like that.

But easy loading is just the first of many improvements you'll find in "Nilite" 101.

It has a rock-breaking wallop you've learned not to look for in "economy" explosives. In fact, you'll get performance equal to that of 60% extra dynamite.

What else?

We've counted 12 ways you'll save time, save money and move more rock per day.

They're on the next page . . .

1. **LOW COST** The low price of "Nilite" 101, plus the low labor costs (no mixing on the job, no caked and hard-to-pour bags), add up to real blasting economy.

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3. **NO LOST STRENGTH** Because there's no on-the-job mixing, you don't risk losing strength through ineffective blending which can decrease an explosive's potential strength by 30% or more.

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6. **NON DUSTING** Even when loading on windy days, there is no dust problem with "Nilite" 101.

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7. **NO HEADACHES** "Nilite" 101 will not cause headaches among your blasting crew.

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UNTIL *YOU* tear open a bag of "Nilite" 101, you'll never know whether you are paying more than you should for each blast.

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DU PONT EXPLOSIVES DEPARTMENT
6440 NEMOURS BUILDING, WILMINGTON 98, DELAWARE

Please send me the fact-sheet on your new economy explosive, "Nilite" 101. ☐ I would also like to see a salesman.

NAME .....

COMPANY ..... TITLE .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....

NEW WAY
to lower stripping costs

The Mullet Coal Co., Wilmot, Ohio, is using a 4500 VICON hi-lift shovel with 60 ft. boom and 4½ yd. dipper to strip sandrock, shale, and clay overburden varying in depth from 30 to 35 ft. Making a full 80 ft. cut over the coal seam, the VICON moves an average of 500 yds. per hour.

MANITOWOC

SEE WHY THREE OHIO STRIP MINES ARE MOVING MORE OVERBURDEN WITH THE NEW MANITOWOC 4500 VICON

Detailed field reports prove that the revolutionary new Manitowoc VICON is paying off in added output in strip mining areas everywhere. There are three good reasons why the new VICON is bringing substantial yardage increases to the owners of the strip mines pictured here —and at lower cost.

ONE. INTEGRATED CONTROLS — VICON operating levers are a combined linkage of clutch control *and* throttle with response balanced so that clutches are applied prior to engine acceleration. Clutch engagement, therefore, is faster, smoother . . . slippage, and subsequent wear, is greatly reduced. This is "Variable Independent Control" (VICON) provided for each operational function.

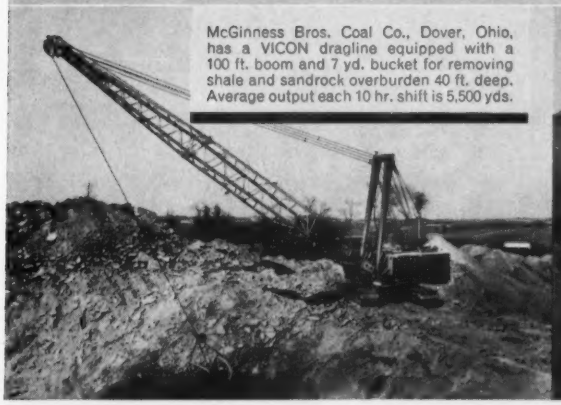
TWO. INTERLOCK, a key feature of VICON design for dragline operations. Hoist and drag drums are interlocked to automatically synchronize their operation. With Interlock, cycle time is faster and output greater because full horsepower is always available for hoist—the operator doesn't "soak it up" with the drag brakes. Operating costs are noticeably less, too, because brake use is cut 50% and lining wear is drastically reduced. Bucket control is unsurpassed.

THREE. DUAL INDEPENDENT ENGINES enable the operator to perform several functions simultaneously with full power instantly available for each function. They provide an infinite variety of hoist and swing speed combinations without the *conventional* problem of clutch slippage, and permit the operator to match the speed of separate phases of each cycle to existing job conditions.

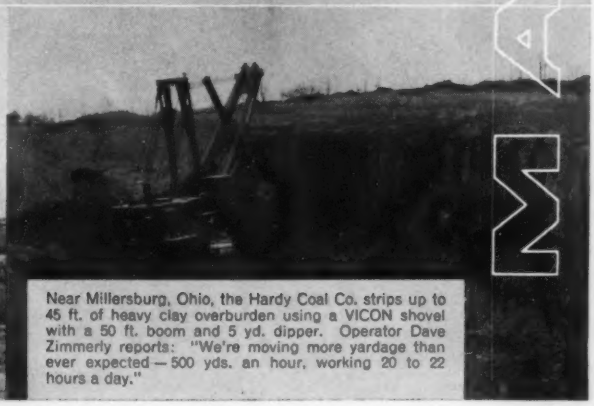
There are many other reasons why the Manitowoc VICON is the only *really new* excavator design since steam. If you are planning on a new stripper or loader soon, get full VICON information from your Manitowoc distributor, or write for details.

MANITOWOC ENGINEERING CORP.
(A subsidiary of The Manitowoc Company, Inc.)
MANITOWOC, WISCONSIN

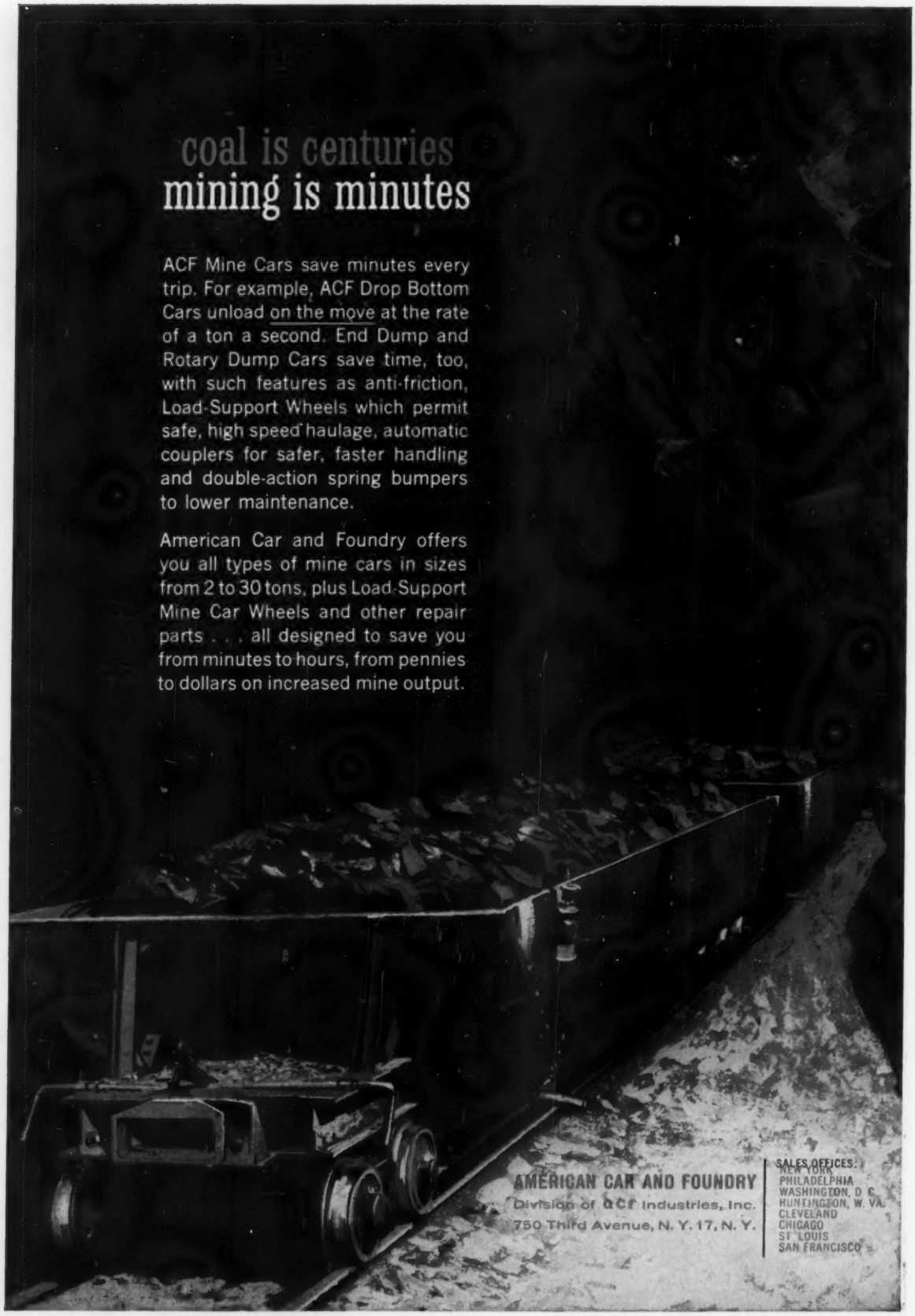
SHOVELS 1¼ to 6 YDS. **Manitowoc** **DRAGLINES** 1¼ to 7 YDS.



McGinness Bros. Coal Co., Dover, Ohio, has a VICON dragline equipped with a 100 ft. boom and 7 yd. bucket for removing shale and sandrock overburden 40 ft. deep. Average output each 10 hr. shift is 5,500 yds.



Near Millersburg, Ohio, the Hardy Coal Co. strips up to 45 ft. of heavy clay overburden using a VICON shovel with a 50 ft. boom and 5 yd. dipper. Operator Dave Zimmerly reports: "We're moving more yardage than ever expected — 500 yds. an hour, working 20 to 22 hours a day."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mining is minutes
ACF Mine Cars save minutes every trip. For example, ACF Drop Bottom Cars unload on the move at the rate of a ton a second. End Dump and Rotary Dump Cars save time, too, with such features as anti-friction, Load-Support Wheels which permit safe, high speed haulage, automatic couplers for safer, faster handling and double-action spring bumpers to lower maintenance.
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Equipment Approvals

The Jeffrey Mfg. Co.—Type MM-76 Colmol with 94-A bridge conveyor; five motors, three 50 hp and two 3 hp, 250 V, DC. Approval No. 2F-1573, August 2.

Goodman Mfg. Co.—Type 964-B loading machine with reverser; four motors, each 20 hp, 250 V, DC. Approval No. 2F-1574, August 11.

Compton, Inc.—Type CU42 continuous miner; two motors, each 100 hp, 440V, AC. Approval No. 2F-1575A, August 5.

Lee-Norse Co.—Model U131-5K water spray pump; one motor, 8 hp, 230 V, DC. Approval No. 2F-1576, August 18.

Goodman Mfg. Co.—Type 427 continuous borer with dual control; two motors, one 250 hp and one 50 hp, 440 V, AC. Approval No. 2F1577a, August 31.

In addition to the above permissible equipment, acceptance designation "Fire Resistant USBM No. 28-29," was assigned to the Dunlop Rubber Co., Ltd, to identify conveyor belts that have been accepted by the bureau as being fire resistant.

Preparation Facilities

Island Creek Coal Co., Algoma preparation plant, Algoma, W. Va.—Contract closed with The Deister Concentrator Co., Inc., for four Concenco No. 77 twin-deck washing tables for handling $\frac{5}{8}$x28 mesh coal.

Yellow Flame Coal Co., Hazleton, Pa.—Contract closed with The Deister Concentrator Co., Inc., for four Super-Duty Diagonal Deck Model HCRD No. 7 washing tables, for cleaning No. 1 buck, rice and barley size anthracite.

Page Coal & Coke Co., Pageton, W. Va.—Contract closed with Kanawha Mfg. Co. for a heavy-media washing plant (Fuel Process Co. vessel), for handling 6x$\frac{3}{16}$ coal, capacity to 250 tph.

Clinchfield Coal Co., Moss No. 3 preparation plant, Clinchfield, Va.—Contract closed with Link-Belt Co. for a heavy-media addition, including a Link-Belt Model 120 tank-type heavy-media concentrator, for cleaning 400 tph of 1¼ by ¼ in coal and 4 in by 1¼ middlings. Completion scheduled for December, 1960.

2 ways Gates high capacity V-Belt Drives contribute to industry profits

ON IN-PLANT EQUIPMENT, Gates Super HC V-Belt Drives lower maintenance costs—as on this pump at Scott Paper Company's Detroit plant. The pump was formerly driven by a special belt, but 6 of these belts failed in about 3 months. In comparison, a Super HC Drive has been operating for the past year with NO down time and NO replacement cost.

ON EQUIPMENT FOR SALE, Super HC High Capacity V-Belts produce savings all down the line—as on these sand pumps being readied for shipment from Denver Equipment Company's plant. With Super HC, sheave dimensions can be reduced 30% to 50%, overall space up to 50%, drive weight by 20%, and drive cost by as much as 20%, compared to previous drives.

A little more than a year ago Gates introduced a new high capacity V-belt—a slimmer, tougher, more flexible V-belt with far greater capacity to transmit horsepower than conventional belts.

Because this revolutionary V-belt permits narrower sheaves, fewer belts, and closer center distances, hundreds of plants across the country have found Gates Super HC V-Belt Drives contribute to profits in 2 ways: through marked savings in drive costs on production machines *within* the plant and on powered equipment manufactured *for sale*.

Gates V-Belt Distributors and Field Engineers are listed in the Yellow Pages in all major industrial centers. Ask your distributor for the handbook, *The Modern Way to Design V-Belt Drives.* TPA 544

The Gates Rubber Company, Denver, Colorado
Gates Rubber of Canada Ltd., Brantford, Ontario

same hp capacity in smaller "package"

The Mark of *Specialized* Research

GATES SUPER HC HIGH CAPACITY V-BELT DRIVES

Current Coal Patents

By Oliver S. North

Separation of fine sized solids, J. R. Pagnotti and S. Barron (assigned to Mineral Processing Corp.), Aug. 16, 1960. Efficient and economical process for the separation of fine particles of different specific gravities, especially fine coal from slate, etc., in the minus 10 mesh range, using a liquid suspension of heavy media without a step to eliminate extreme fines, or steps which include classification, either mechanical or hydraulic. A method is provided for destroying coalescence of the media solids in the liquid suspension. Media solids are reclaimed from the fine sink and float fractions. U. S. Bureau of Mines patent No. 2,949,190.

Processing of lignite, R. V. Heinze and L. H. Reyerson (assigned to Submerged Combustion, Inc.), Aug. 16, 1960. Improved method for processing lignite whereby an initial drying step is not required. The wet lignite is subjected to partial oxidation with an oxidizing gas, such as an oxide of nitrogen or a halogen. The water-soluble carboxylic acids thereby produced are recovered. No. 2,949,350.

Hydraulic pit prop, F. G. Reuter (assigned to Mobay Chemical Co.), Aug. 23, 1960. Design for a sturdy hydraulic pit prop that is easy to handle and has long service life even under rough working conditions in the mine. An inflatable polyurethane rubber body is positioned in the pressure chamber. No. 2,949,895.

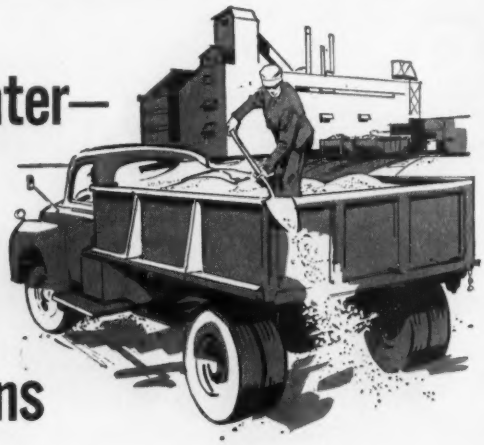
Cutting bits and bit holders, C. B. Krekeler, A. O. Bruestle and J. R. Cartlidge (assigned to Cincinnati Mine Machinery Co.), Aug. 23, 1960. A rhomboidal double-ended cutter bit has a face length 70-95% of overall bit length, a thickness 10-30% of overall bit length, and a width greater than the thickness. Such bits are lighter in weight and cheaper than the usual throw-away bits, yet are capable of performing the same heavy duty service. No. 2,950,096.

Mine face traversing mining head, A. R. Anderson (assigned to Colmol Co.), Aug. 30, 1960. Design for a continuous mining and loading machine which is adapted to remove coal from the mine face, gather the dislodged material, and load it into a mine car, shuttle car, or conveyor at the rear of the machine. The mine room floor can be trimmed and smoothed during gathering of the broken coal. No. 2,950,907.

Load sensing system for flexible strand supported endless belt conveyors, R. M. Buckeridge (assigned to Goodman Mfg. Co.), Sept. 6, 1960. In a system for sensing the load at a transfer point between two conveyor belts, the sensing mechanism measures the deflection of the wire rope frames when the conveyor is loaded for more than a predetermined amount along its length. This mechanism is utilized, for example, to stop a cross entry conveyor belt, to prevent further discharge onto a gathering conveyor that is fully loaded. No. 2,951,576.

Tension control apparatus for belt storage loop of an extensible belt conveyor, J. J. Slomer (assigned to Goodman Mfg. Co.), Sept. 6, 1960. Hydraulic system for accurately controlling the tension of the belt in a belt conveyor. Supplemental elastic means are used to supplement the

This winter—
speed
your
colliery
operations



Use Sterling Rock Salt to keep your roads, platforms, walks clear and safe . . . to prevent frozen switches and scales. This powerful melting agent helps remove treacherous snow and ice *fast!* It eliminates costly delays around the mine, saves labor during critical cold-weather periods. Sterling Rock Salt is easy to handle and apply, is harmless to hands and clothing.

Give your customers "free-running" coal, too! Sterling Rock Salt prevents coal from freezing in transit, so it can be unloaded quickly and easily. (It takes only 5 lbs. of Sterling Rock Salt to protect one ton of bituminous; 5-8 lbs. for anthracite.) Customers will gladly pay the small premium for coal treated with Sterling Rock Salt! Comes in bulk carloads or packed in 100-lb. bags.

Free folder gives further information on Sterling Rock Salt for mines, collieries. Ask your Sterling representative or write to INTERNATIONAL SALT COMPANY, DEPARTMENT CA 10, CLARKS SUMMIT, PA.

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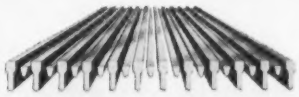
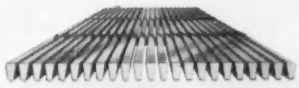
STERLING ROCK SALT
INTERNATIONAL SALT COMPANY, INC.

T-WEDGE KLEENSLOT



A new concept in guard bar design. T-shaped wire replaces typical "bar" to increase screening surface while keeping large unscreenable lumps of material above the tolerance governing lower screening surface.

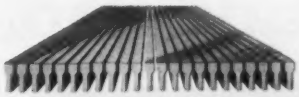
F217 and F250 KLEENSLOT



Manufactured with large size wedge shaped wires to maintain maximum efficiency over an extended period in abrasive applications.

Although large in wire size, this screen will easily maintain openings as close as 1 m.m.

G187 and GB187 MIGH-TEE KLEENSLOT



Special profile increases wearing surface. This is a heavy duty precision type screen that will easily maintain openings smaller than ⅛ m.m. and openings larger than ordinarily considered economical.

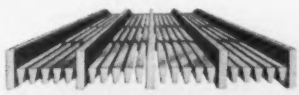
"S" KLEENSLOT

Engineered for applications where screening out of flats or slivers is of prime consideration. Can be also furnished in a "C" bend. Recommended for applications requiring openings larger than 1 m.m. For smaller openings, see Marcel screen.

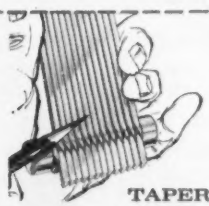
MARCEL

This screen, while screening out "slivers," presents a flat surface for materials to wipe the opening clean. Available with openings up to 1 m.m.—for larger openings see "S" screens.

SCREEN GUARD

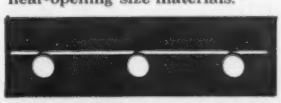


Vertical guard bars keep larger unscreenable materials above the actual screening surface. This increases screen life and promotes much greater efficiency in dewatering.



TAPER-SLOT

From loop to loop, the screen opening gradually increases. This design is to eliminate blinding when screening large amounts of near-opening size materials.



For example: .016 opening tapered to .024—the combination of opening sizes would be the same between each loop throughout the entire screen.

WEDGE-WIRE

Kleenslot

REG. U. S. PAT. OFF.

PREPARATION SCREENS

designed for vibrators or stationary applications for dewatering, screening, washing, extracting, filtering or sizing applications.

Wedge-Wire Kleenslot Screens are custom manufactured to your application and are available in many sizes, metals and finishes. Our engineering staff will assist you capably and promptly in obtaining the proper screen for highest production at lowest cost.

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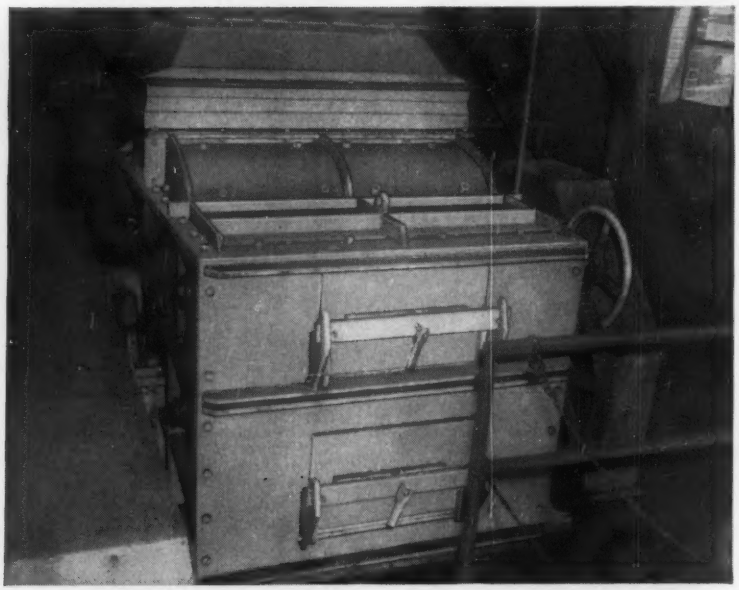
CRUSHING FACTS

from *American* PULVERIZER CO.



USER REPORT

"NO PARTS REPLACED IN 6 YEARS OF SERVICE"

The operation record at this municipal power station again proves the stamina and trouble-free performance of American AC Rolling Ring Crushers.

Although reducing ROM coal (up to 6" size) to ¾" this crusher has never needed a part replacement. Over 334,000 tons of coal have been reduced since installation.

The double life of the American-originated rolling shredder ring brought further economy. The rings, which split coal instead of crushing it, are reversible. After four years the rings were reversed to put the unused edges to work. This adds more years to their operational life.

Since 1908, American Pulverizer has manufactured reduction equipment exclusively. Every crusher is custom-built to meet your requirements and ruggedly constructed to give you the lowest possible cost per ton of coal reduced.

Our Engineering Department will help you with your reduction problem and recommend the proper equipment.

Complete Literature Available. State your tonnage requirements.

6012

American PULVERIZER COMPANY

ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS

1119 MACKLIND AVE. ST. LOUIS 10, MISSOURI

Coal Patents (*Continued*)

elasticity of the belt in the case of a short, relatively non-elastic belt, in addition to a hydraulic type accumulator in the pressure line when required. No. 2,951,580.

Multiple coal auger, W. D. Carothers (assigned to The Salem Tool Co.), Sept. 6, 1960. Design for a multiple coal auger for mining the entire coal face defined by the outlined path of its cutters. The machine has right and left hand augers that overlap each other for their full length and rotate in opposite directions for conveying coal rearwardly and are mounted to have limited swiveling action. No. 2,951,693.

Bituminous Output

YEAR TO DATE	PRODUCTION
Sept. 17, 1960	293,080,000
Sept. 19, 1959	288,285,000

1960 output 1.7% ahead of 1959.

WEEK ENDING	PRODUCTION
Sept. 17, 1960	8,130,000
Sept. 19, 1959	7,803,000

Anthracite Output

YEAR TO DATE	PRODUCTION
Sept. 17, 1960	12,383,000
Sept. 19, 1959	14,288,000

1960 output 13.3% behind 1959.

WEEK ENDING	PRODUCTION
Sept. 17, 1960	368,000
Sept. 19, 1959	400,000

Coming in Coal Age:

Annual meetings of mining institutes and other industry organizations are in full swing. See the report of the St. Louis AIME meeting beginning on p 66 in this issue. The November and December issues of *Coal Age* will contain reports on meetings of ME-MMA, National Safety Council, Joint Fuels Conference, IMI, KMI, West Virginia-Central Appalachian (AIME) at the Greenbrier and—the Cincinnati convention of the United Mine Workers. Make a special effort to attend the meetings of your choice, but if you can't get there, get *Coal Age*.

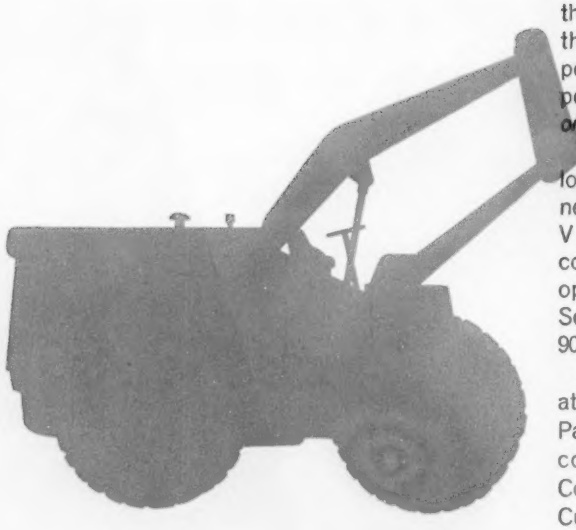
Also . . .

A feature of the December issue will be the fourth in the *Coal Age* series of Operating Guides, this one dealing with belting and belt conveyors.

CUMMINS V DIESELS
MORE COMPACT
MORE POWERFUL

CUMMINS

ADDS A 700HP V12 DIESEL TO A GROWING LINE OF CONSTRUCTION ENGINES



Newest of the V diesels from Cummins is the VT12-700. A real workhorse. It's big in horsepower, but not in size. Truly the most compact, most powerful highspeed engine on the market. And turbocharging permits full rated horsepower up to 10,000 feet.

Like the VT-700, the new, naturally aspirated V12-525 has features that will reduce operating costs. Both 12 cylinder engines have internal fuel and oil lines which eliminate damage to exposed tubing and connections. The revised PT fuel system automatically compensates for wear—needs only the simplest maintenance. A basic block improvement gives you a stronger, more durable engine.

The increased power of these new diesels is a natural advance from the famed VT-600 and NVH-450. For more than ten years these two models have had the field to themselves. Only Cummins could better their proven performance. How? By redesigning the cylinder area to permit higher horsepower at no increase in engine size *or engine wear.*

This big bore feature is also part of the V diesels at the lower end of the line . . . the V8-350 and the VT8-430. All new, all power from the pan up, they're the first 8 cylinder V diesels in this horsepower bracket built specially for construction equipment. Every kind of application, every operating condition was considered in their design. Service is easy because all accessories are mounted in the 90° angle between the cylinder banks.

Be assured of continued low operating costs with Genuine Cummins Parts and qualified service. For the complete profit story, see your Construction Equipment Dealer or Cummins Distributor.

CUMMINS

CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

International Sales & Service • Cummins Diesel International Ltd., Nassau, Bahamas • Cable: Cumnas

Overseas Factory • Cummins Engine Company Ltd., • Shotts, Lanarkshire, Scotland

6-17-60

V8·350 HP

VT8·430 HP

NVH·450 HP

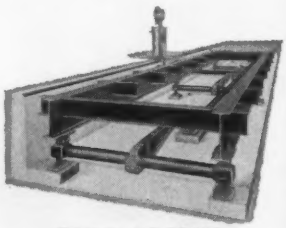
V12·525 HP

VT·600 HP

VT12·700 HP

Winslow
TRUCK SCALES
PIT AND PITLESS TYPES

TYPE CS—PORTABLE—PITLESS
Capacities 15 tons thru 50 tons. Platform sizes 18' x 9' thru 50' x 10', wood or steel deck.



TYPE S—PIT SCALE
Capacities 15 tons thru 60 tons. Platform sizes 22' x 9' thru 60' x 10' for wood or concrete decks.

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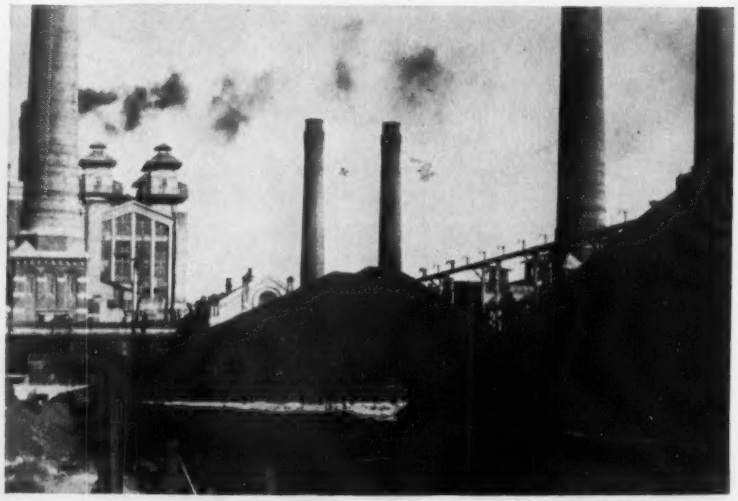
Coal Abroad



IN WESTERN EUROPE, the generating plant yard, well stocked with coal, is not as common a sight as in years past, as many utilities switch to oil.

European Coal Miners Look For New Jobs

Workers leave the mines in search of greener fields as worsening coal plight threatens their security.

AN EXODUS of coal miners threatens to accelerate increasing stagnation in the western European coal industry, and chiefly in the Ruhr.

According to recent estimates, 81,000 German miners had voluntarily turned in their equipment, and guessing is that by the end of the year the shifting to new fields will total 100,000. At present 7,000 jobs in the Ruhr mines remain unfilled and there is a shortage of 10,000 apprentices.

Elsewhere in Europe, there is a similar trend. In Belgium, for example, the government, Belgian industry and the High Authority of the Coal and Steel Community has found it necessary to band together to prevent the Borinage mining district from becoming a region of ghost towns. A new aluminum works has been built there and several other factories are under discussion. The same is true of France and Italy.

In most of these nations, depressed conditions due to oversupply rather than disinterest on the part of the miners has created the crisis. In February, the High Authority agreed to aid the Italian coal industry to the extend of $6,500,000, for the installation of plants making chemicals, cement, lime, liquid gas and other materials. All are to be situated in Sardinia, where the Solcis coal mines have had to reduce their labor forces drastically. At least 50% of the dismissed miners are to be employed in the new industries.

For German as well as for other western European miners, the transfer from the pits to factories and skills is being cushioned also through the "readaption" fund of the European Coal & Steel Community, amounting in midyear to $42 million.

No Letup—In contrast to the belief of some experts that the coal surplus crisis would abate with time, there has been only slight improvement in the situation. Stocks of coal presently piling up at community member pitheads amount to some 31½ million tons.

As the European coal versus oil fight grows hotter, officials at the community's headquarters disclose that the measures so far taken to redeem coal are completely inadequate to withstand the heavy attack on coal by oil and by imported coal. Despite a continuing boom in European iron and steel, and despite somewhat drastic measures taken by some member countries of the community, coal is steadily losing ground and its position is growing precarious.

From a technical point of view, the community's planners claim that the position of European coal has improved considerably through the last 6 yr. Between 1954 and 1959, the number of

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Cut disconnect-reconnect time by as much as 50%

The FALK Spacer Coupling is specially designed for quick installation or removal *without disturbing the driving or driven unit.* This feature can save you up to 50% in disconnect-reconnect time when critical equipment—a process pump, for example—needs repair or replacement.

Here's another saving: with the FALK Spacer Coupling, you can quickly realign shafts *without the usual loss of operating temperature!*

And still another: you can remove or reinstall the FALK Spacer as a unit *without draining the lubricant.*

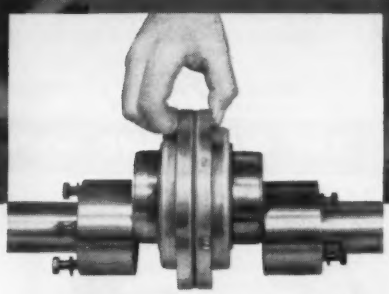
Because of its exclusive grid-groove Steelflex design, the FALK Spacer can accommodate residual misalignment—parallel, angular, or (most important) *both.* Also, it provides torsional resiliency that cushions shock and vibration. Thus it saves wear-and-tear on your connected equipment.

To prove these claims and enjoy these savings, install a FALK Spacer on one application—and see for yourself. Consult your FALK Representative or Authorized Distributor.

THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN

MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS

Representatives and Distributors in many principal cities.

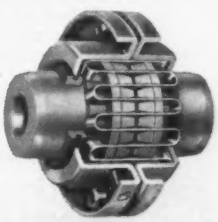


EASY AND QUICK TO INSTALL, DISCONNECT OR RECONNECT

First, mount shaft hubs to allow proper distance between hubs; then, align driving and driven units.

Second, compress Spacer to fit space between hubs and tighten cap screws to pull spacer hubs into the registered fit.

To disconnect, reverse the second step. No draining of lubricant necessary.



The heart of the FALK Spacer ...the basic Type F Steelflex

Write for Service Manual 4838

FALK

...a good name in industry

Maintenance Tip No. 1

GRIPPER EDGES ON VIBRATING SCREEN SECTIONS

Is the gripper or flange design right for your vibrating equipment? Are the flanges held parallel? Is the radius of the flange hook correct? Does the cloth lie flat? Are the ledges clean? Is the tension drawn on the screen section squarely? Check these points carefully to correct gripper edge problems. Call Cleveland Wire Cloth for valuable assistance and top quality vibrating screen section cloth.

Write for ***FREE*** maintenance-reducing check sheet today.

THE CLEVELAND WIRE CLOTH & MFG. CO.

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Coal Abroad *(Continued)*

productive pits has been reduced from 442 to 350 at the same time as the number of pit employees was cut from 662,000 to 609,000. Throughout the same period, the output per shift per man increased from 3,163 pounds to 3,799 lb. To keep pithead stockpiles to a manageable size, coal production in 1959 was reduced by about 10 million tons to an annual figure throughout the community of about 235 million tons.

Planners at the Luxembourg headquarters of the community are of the opinion that coal's position can only be retrieved by adopting 'daring and radical' measures well beyond the potentialities offered by the terms of the Coal and Steel Community's agreement. Above all, coal's position within the framework of a coordinated energy policy must be clarified at once and, of especial importance, the duration and the scope of the measures to be adopted to put coal back onto its feet again, must be determined now so that the coal industry is given a chance to quickly adapt itself to the new conditions on the energy market.

Germany's recent tax on heating oils was considered a step in the right direction and the Coal and Steel Community welcomes the proposal that France too, may soon impose a substantial tax on heating fuels.

Overseas Flashes

GERMANY—The Ruhr coal mining industry is considering construction of a coal pipeline from the Ruhr Vial Fulda A Erlangen to Regensburg on the Danube. A consortium formed for planning the project has secured cooperation of the Consolidation Coal Co., Pittsburgh, whose 110-mi pipeline in Ohio is reported to have cut coal transport cost by one-third compared to rail transport. The pipeline now under consideration would be about 300 mi long with a diameter of 15 in. It would have an annual capacity of about 3 million metric tons.

GREAT BRITAIN—After 3 yr of coal price stability, Britain's state-owned coal industry, faced with rising stocks and higher labor costs, has decided to hike pithead prices of all coal in an attempt to gain extra revenue. Coal prices are expected to go up an average of six shillings and eight pence (about 93c), or about 8% a ton. Domestic consumers and the railroad industry, the largest coal purchasers, are the hardest hit, and face increases of an average of 10 shillings a ton.

Coming Meetings

National Safety Congress, 48th annual meeting, Oct. 17-21—Coal Mining Section, Conrad Hilton Hotel, Chicago, Ill.

Biennial Symposium on Drilling and Blasting, Oct. 17-19 — Colorado School of Mines, Golden, Colo.

ASME-AIME Joint Fuels Conference, Oct. 24-25 — Daniel Boone Hotel, Charleston, W. Va.

Central Appalachian Sect., AIME, and West Virginia Coal Mining Institute, joint meeting, Nov. 4-5—Greenbrier Hotel, White Sulphur Springs, W. Va.

Penn State 2nd anthracite conference, Nov. 15-16. Technical and scientific aspects of anthracite utilization will be discussed in a variety of papers, including "The Briquetting of Anthracite."

Coal Mining Institute of America, 74th annual meeting, Dec. 15-16—Penn Sheraton Hotel, Pittsburgh, Pa.

NEW! CARMET® BR and RB

Quick-Change Bits

For Faster Changes ... For Longer Life

Faster bit changes and fewer of them are yours with the new Carmet cutter bits designed for tool blocks using a Neoprene cylinder to hold bits without setscrews. Special Carmet advantages make cutting easier, tools last longer.

B style has a flat, square back gage stop to prevent tearing the block and wearing the neoprene, and a front removal notch. RB has a front gage stop and back removal notch for applications where it is easier to remove the bit from the back. The RB's two step tip design leads to easier regrinding, and lower grinding costs.

Detail features of these bits are shown at the right, and both are available with open faced, full radius carbide inserts (designated B and RB), or with the round, cylindrical plug insert (designated BR and RBR).

Why these new Carmet Cutter Bits are Better and Last Longer

- √ Gage stops are flat — designed to prevent battering and swedging of tool blocks.
- √ Gages are a full ⅜ inch and have smooth edges to eliminate splitting and mushrooming of blocks. This design also insures longer life for the Neoprene cylinder that holds the cutter bit.
- √ Three grades of carbide are available in Carmet cutter bits—to give you long life by matching the right carbide grade to your cutting requirements.

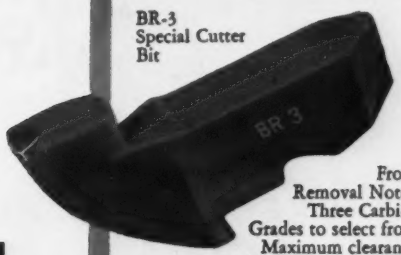
Quality Is In Every Carmet Cutter Bit

Carmet makes its own cemented tungsten carbide inserts. Carmet control over all phases of bit manufacture is your guarantee of top quality.

Call on your local Carmet distributor for mining tools with quality built in all the way through. He has complete stocks of the Carmet tools you need and can help you in their selection because he knows local mining conditions. And, your Carmet distributor is always glad to send out the Carmet field engineer to help you solve tool problems and cut mining costs—or even set up an entire tooling program for your particular mining operation.

Insist on the best in tools and local service. For a catalog supplement sheet on the BR and RB quick change bits, call your local Carmet distributor (see list), or write: Allegheny Ludlum Steel Corporation, Carmet Division, Ferndale, Detroit 20, Michigan. Address Dept. CA-10.

BR-3
Special Cutter
Bit



Front
Removal Notch
Three Carbide
Grades to select from
Maximum clearance
for easier cutting—no
heeling or drag Flat, square gage stop
Notch for Neoprene Cylindrical
wedge

B style cutting bits are the same as above with an open-faced radius Carmet Carbide insert.

RB-3 Special Cutter
Bit With Front
Gage Stop

Easier regrinding—
saves grinding costs
New removal notch
Flat Gage Stop prevents wear on block and Neoprene

RBR-3 style cutting bits are the same as above with a round cylindrical Carmet Carbide plug-type insert.

Get more information from your local Carmet distributor:

Supplement to the Carmet Mining Tool Catalog lists advantages and quantity prices of the new time-saving bits. For your copy see your distributor, or write Carmet.

Birmingham Bolt Co., Ensley, Ala.
Bluefield Hardware, Bluefield, W. Va.
Brace-Mueller-Huntley, Inc.
Offices: Buffalo, Rochester & Syracuse, N.Y.
Carbon Transfer, Helper, Utah
Carlsbad Supply Co., Carlsbad, New Mexico
Consolidated Supply Co., Picher, Okla.
C. F. Gharst Supply Co., Terre Haute, Ind.
Gladstein Co., McAlister, Okla.
Goodman Manufacturing Co. Chicago, Ill.
Marion Mine & Mill Supply Co., Nashville, Tenn.
McCombs Supply Co.
Offices: Harlan, Ky. & Jellico, Tenn.
Mine Equipment & Supply Co., Madisonville, Ky.
Oglebay Norton Mine Supply Div. St. Clairsville, Ohio
Peerless Supply Co. Des Moines, Iowa
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Offices: Williamson, W. Va. & Charleston, W. Va.
W. B. Thompson Co., Iron Mountain, Mich.
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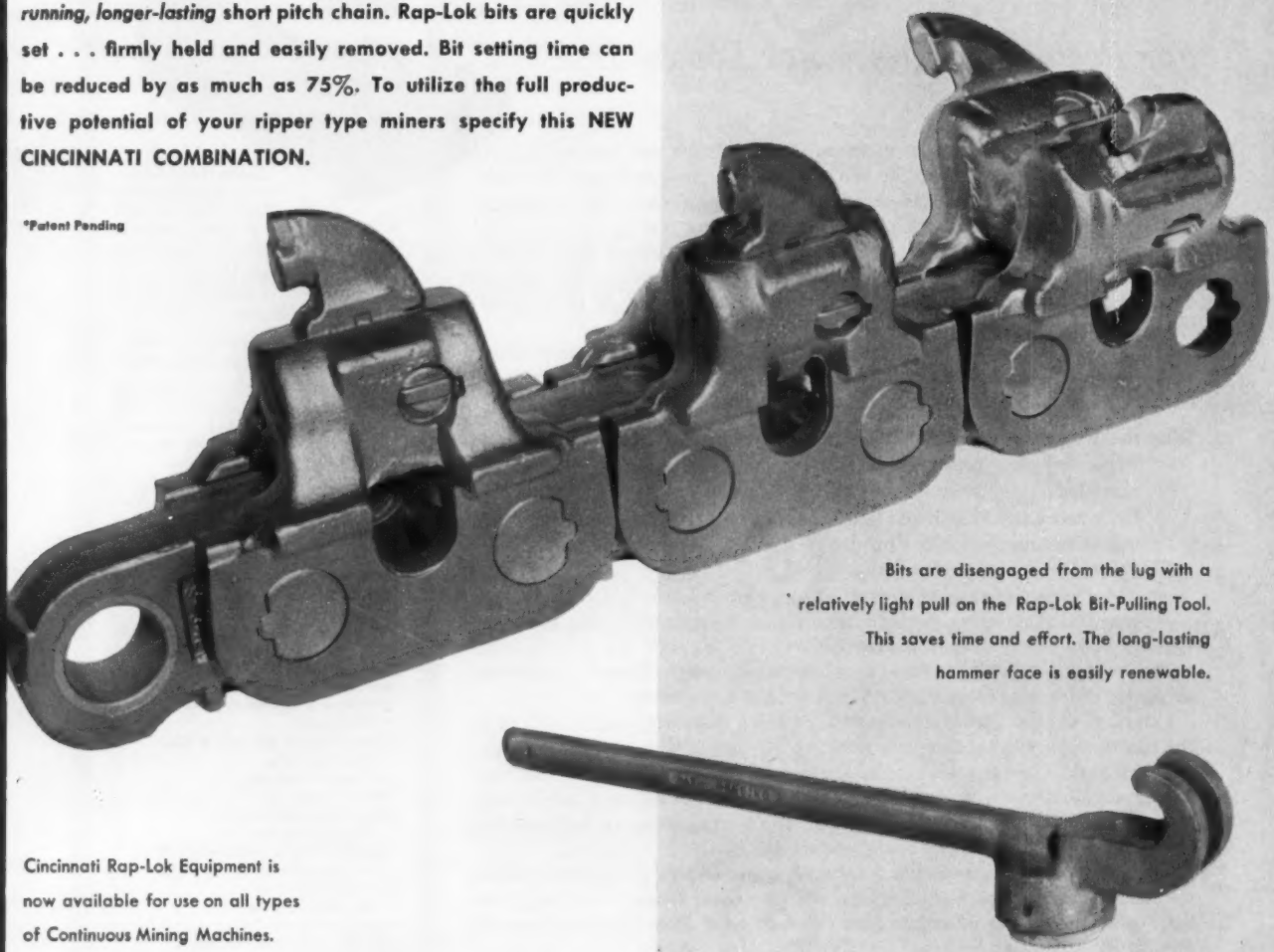
3911

A NEW "CINCINNATI" COMBINATION

THE PROVEN SHORT PITCH RIPPER TYPE CHAIN WITH THE TIME SAVING RAP-LOCK PRINCIPLE

THE Cincinnati "Short Pitch . . . Rap-Lok" Chain combines an entirely new concept of bit holding with the *smoother running, longer-lasting* short pitch chain. Rap-Lok bits are quickly set . . . firmly held and easily removed. Bit setting time can be reduced by as much as 75%. To utilize the full productive potential of your ripper type miners specify this NEW CINCINNATI COMBINATION.

*Patent Pending

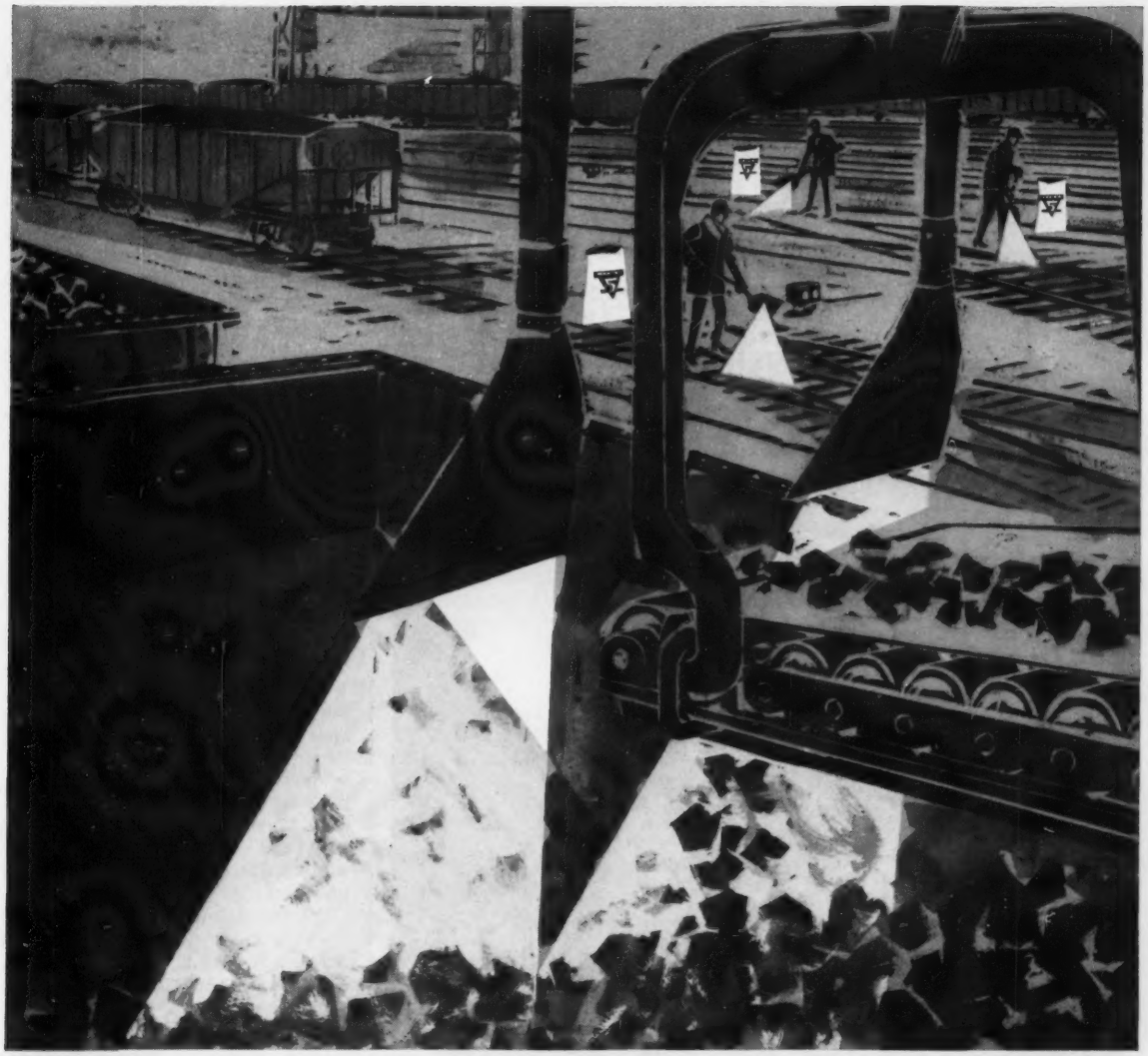


Bits are disengaged from the lug with a relatively light pull on the Rap-Lok Bit-Pulling Tool. This saves time and effort. The long-lasting hammer face is easily renewable.

Cincinnati Rap-Lok Equipment is now available for use on all types of Continuous Mining Machines.

THE CINCINNATI MINE MACHINERY CO.

CINCINNATI 25, OHIO



Protect your coal and your equipment Use Morton "Formula 5" with rust inhibitor

"Formula 5" is the safest, most effective freezeproofing compound you can buy

Effective even at sub-zero temperatures, "Formula 5" not only keeps coal free-running for customers, it also is an ideal de-icer for tracks, switches, walks—wherever freezing presents a problem.

"Formula 5," with a new, easily distinguishable blue color, is specially made to meet the requirements set up by coal producers. And, unlike ordinary freezeproofing compounds, "Formula 5" has a rust inhibitor added to protect you and your customers against corrosion of cars, motors, conveyors and other equipment.

"Formula 5" needs no mixing, no special handling. For more effective, more economical freezeproofing, "Formula 5" is treated to produce an ideal dissolving rate and you just apply it dry, direct to coal. "Formula 5" won't cause costly delays by lumping or caking in feeders.

A free-flowing product, "Formula 5" is composed of chemically treated sodium chloride (30-70 mesh) and a special new improved anti-corrosive compound.

Write for free booklet, "The Key to Low Cost Effective Freezeproofing." If you would also like a Morton representative to assist you with freezeproofing and equipment maintenance problems, without cost or obligation, write:

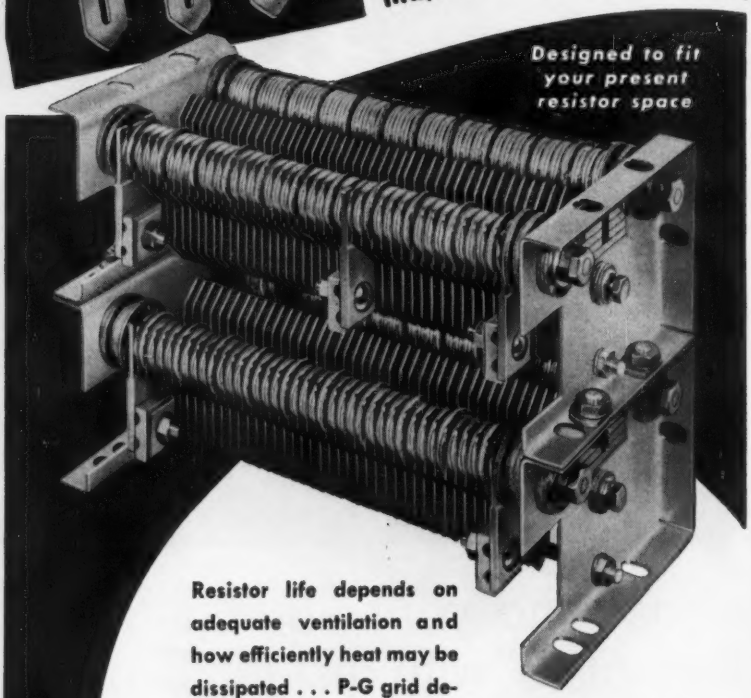
MORTON SALT COMPANY

INDUSTRIAL DIVISION

Dept. C10, 110 N. Wacker Drive, Chicago 6, Illinois

Resistor life depends on adequate ventilation...

Patented P-G Grid Design assures maximum ventilation



Resistor life depends on adequate ventilation and how efficiently heat may be dissipated . . . P-G grid design equalizes the amount of air space surrounding each leg or loop to obtain even heat throughout the grid area. (Note illustration.) . . . Since heat is rapidly and evenly dissipated, hot spots fail to develop and longer resistor life is assured . . . For a nonbreakable resistor (only steel and mica used) specify P-G on your next application.

P-G

The Nonbreakable Steel Grid Resistor

THE **POST-GLOVER** ELECTRIC COMPANY

OFFICE and FACTORY—Kenton Lands Road, Erlanger, Kentucky

MAILING ADDRESS—Box 709, Covington, Kentucky

News Roundup *(Continued)*

Gas & Fuel's Coal Div., headquartered in Pittsburgh, is applying the principles to the coal industry.

No Funds Needed

A coal-based road binder has been fully developed and will not need further state funds for research work, the Peabody-Wright Corp. told the Commonwealth of Pennsylvania recently.

The company met with officials from the state to discuss the need for $150,000 that had been appropriated for development of the new material. The conference was prompted by an ultimatum delivered by the state Coal Research Board that company officials meet with the Attorney General or the whole project would be called off.

The meeting ended 14 mo of wondering whether the state and the subsidiary of Peabody Coal Co. and Curtiss-Wright Corp. would agree to a contract. Initially, Roy Hurley, then president of Curtiss-Wright, started the project when he proposed to Gov. David L. Lawrence and state legislators that the state set aside $500,000 for development of the binder.

The project was pictured as a possible big boost to the soft-coal area employment. Later, a check showed the process would use only 10 tons a mile more coal than used in present processes of road building.

But the governor and lawmakers did not know this at the time and supported the idea, eventually passed a bill appropriating the $150,000 to the Coal Research Board for use in developing the material.

Once the measure was law, every one seemed to lose interest and the matter lay inactive for nearly a year. Curtiss-Wright, in January, 1960, turned over rights to the material's patents to Peabody-Wright, which it formed with Peabody.

Underground Link

Transportation of coal underground is expected to result in substantial economies for Independent Coal & Coke Co., large Utah coal producer.

The company has built a 1-mi underground tunnel, linking from portal to portal, two of its properties in Carbon County, the Kenilworth and Castle Gate mines. W. J. O'Connor, president and general manager, related that coal coming from the Kenilworth mine to Castle Gate, where the firm supplies fuel to a mine-mouth plant belonging to Utah Power & Light, would be hauled through the new tunnel.

Objective of joining Kenilworth and

News Roundup *(Continued)*

Castle Gate is to eliminate overhead and freight charges and to obtain costs that will permit Independent Coal to make a profit on tonnages sold to the generating plant at Castle Gate.

The firm has also done considerable development work in its new "C" seam mine at Castle Gate. The new seam will supplant the abandoned No. 2 mine. Outside facilities at Kenilworth mine were closed Sept. 1, but the firm expects to keep them in operating condition.

Cost of the project was upwards of $300,000, not including seam development work. Mr. O'Connor said that the consolidation should result in lower costs in the last 4 mo of 1960. If sales hold up as estimated, he noted, the firm should have a good last quarter.

Enroll Now

Qualified civilians in business, industry and professions are invited to enroll in a graduate-level correspondence course entitled, "The Economics of National Security", given by The Industrial College of the Armed Forces.

Operating under direction of the Joint Chiefs of Staff, the Industrial College, Washington 25, D. C., conducts courses of study in the economic and industrial aspects of national security under all conditions and in the context of both national and world affairs. Subjects considered include logistical, administrative, scientific, technological, political and social factors, affecting national security.

The 10-mo course extends the facilities and programs of the college to those who are unable to receive resident instruction. Since 1950, when the course was started, more than 9,100 persons have completed it. All text and instructional materials are furnished at no cost to students. Certificates of completion are issued to those who satisfactorily complete the full course.

Qualified persons are urged to apply as follows: Commandant, Industrial College of the Armed Forces, Washington 25, D. C., ATTN: Correspondence Course Div.

New Plant Coming

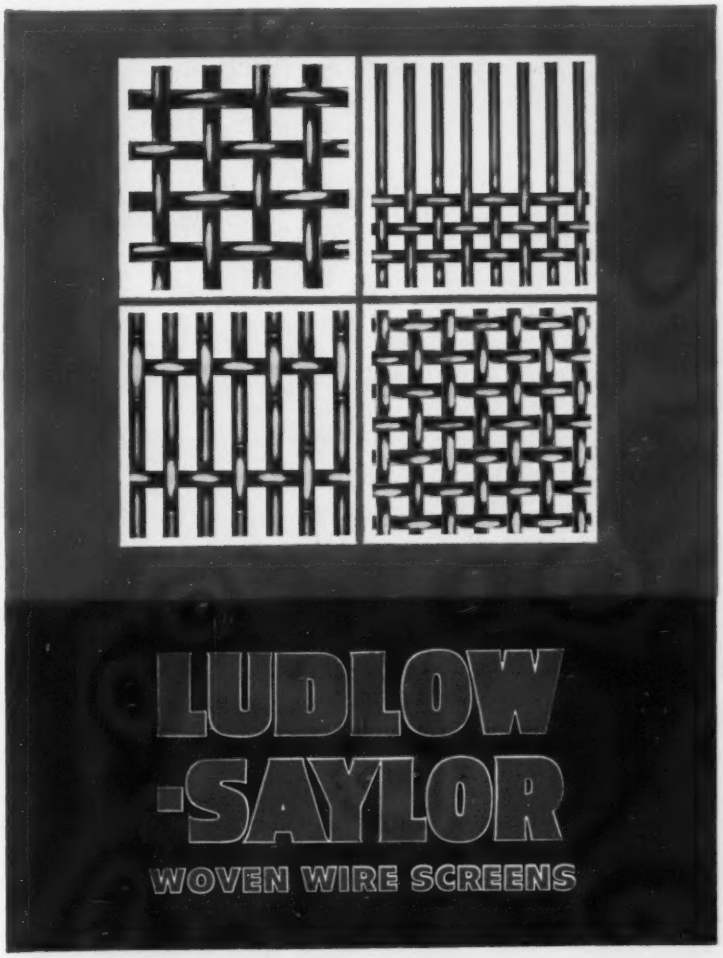
Construction of a new electric generating station is reported in the works for Monongahela Power Co., Fairmont, W. Va., subsidiary of West Penn Electric Co.

The plant—to be started upon when load demand requires it—will generate electricity using steam from coal-fired boilers, it is understood. Monongahela, planning a $40-million investment, would build an 80-ft dam to make the

TOUGHEST SCREENS MADE

The finest quality wire—especially alloyed for hardness and toughness—tightly woven with extreme accuracy into screens that have no equal for resistance against abrasion, distortion and fatigue. Wire ends cut absolutely square and true on giant shears before hook strips are precision-applied guarantee installation under greater tension that prevents excessive wear and breakage—increases feed across the screen—reduces plant-clogging re-circulating loads—produces a more consistently uniform product.

These longer-wearing, profit-making screens should cost more, but don't. Specify, insist on Ludlow-Saylor next time you order replacements.



Ludlow-Saylor Screens and Wire Cloth can be furnished in any steel including SUPERLOY high carbon, LUDLOY oil-tempered, stainless or other alloys; Monel, bronze, copper, brass and most other metals that can be drawn into wire.

IMMEDIATE DELIVERY
—most weaves and sizes

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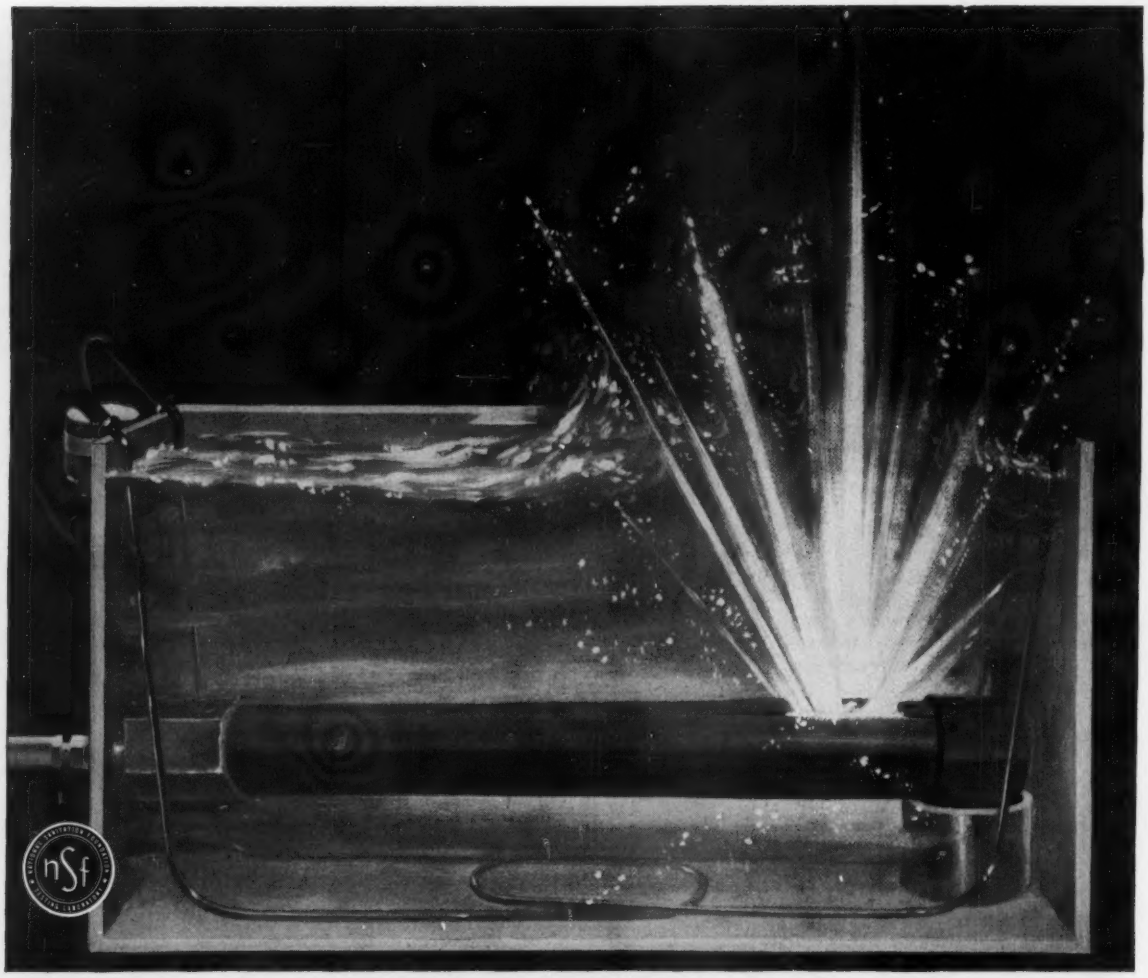

We rupture our plastic pipe so yours won't

This explosion marks the end of the short but useful life of a piece of USS National Polyethylene Pipe. We deliberately burst it during a test with pressure that would greatly exceed the strain of normal service.

The length of Polyethylene Pipe was submerged in heated water; then more water was forced into the pipe until it burst. The pressure was much greater than specifications. Tests like this prove to us that the Polyethylene Pipe we make is more than strong enough for use in your mine drainage applications.

USS National Polyethylene Pipe is unaffected by corrosive mine water, acids, alkalies, salts and other mine chemicals. It eliminates the need for replacement pipe, because it's made to last. Polyethylene Pipe has a temperature range of $-90°$F. to $+120°$F., and it won't crack or break in sub-zero weather.

USS National Polyethylene Pipe is available in sizes from ½ inch to 6 inches in diameter, and in a variety of wall thicknesses. It's light, flexible and easy to handle. For information, write to National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

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National Tube Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors • United States Steel Export Company, New York

WESTINGHOUSE

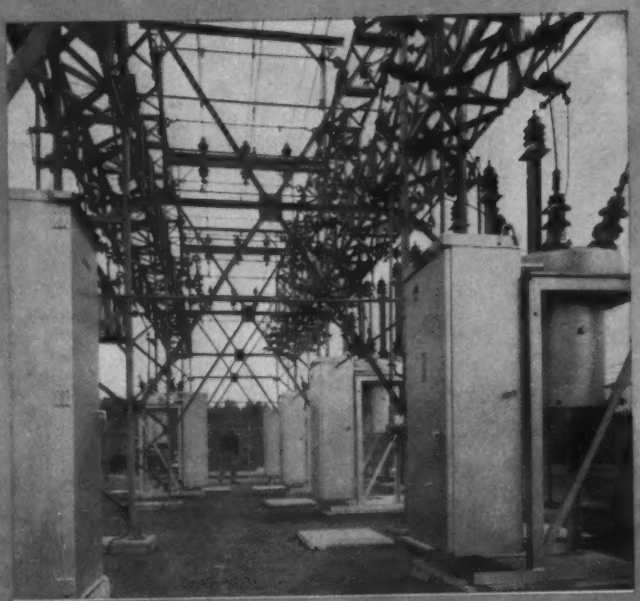
WESTINGHOUSE

WESTINGHOUSE

WESTINGHOUSE

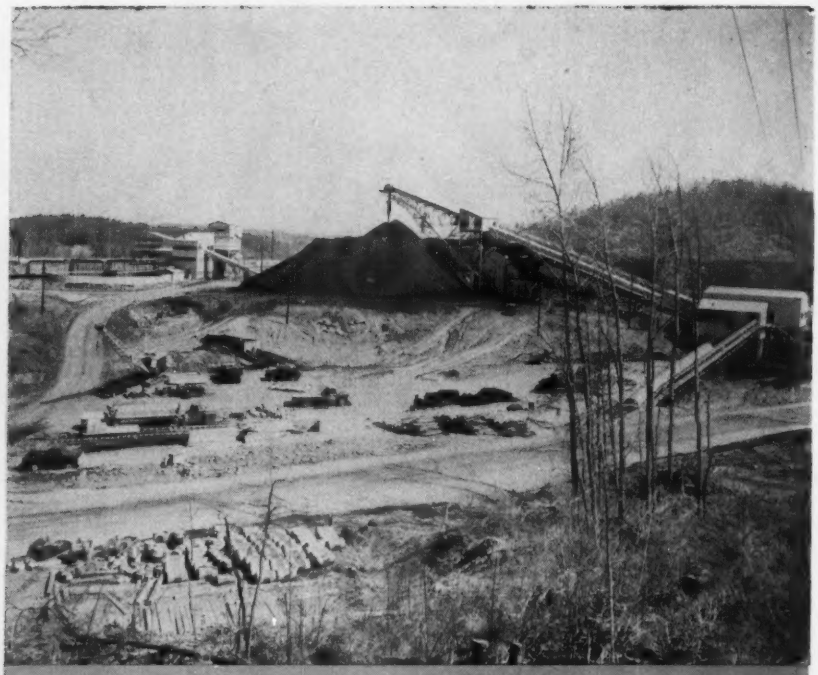
NEW SOUTHERN ELECTRIC GENERATING COMPANY MINE USES A-C POWER DISTRIBUTION SYSTEM

Increased economy, reliability and safety are just three of the many benefits gained from using a-c power in mining operations. At SEGCO Mine No. 1 in Alabama a new Westinghouse distribution system puts a-c power where it's needed at the voltages needed for top machine efficiency. Below, mine engineer inspects mine's main Westinghouse substation.



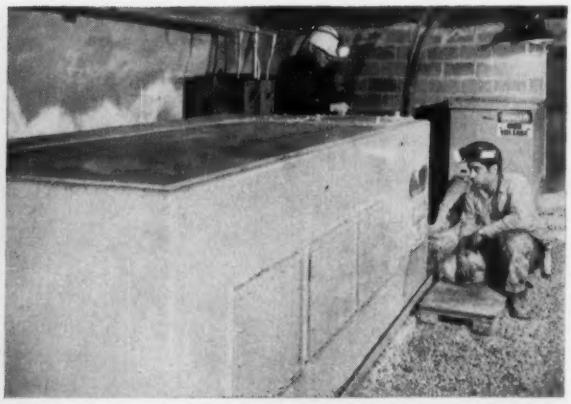
Westinghouse

WESTINGHOUSE EQUIPMENT PUTS POWER AT FULL WORKING STRENGTH



Power for production: SEGCO Mine No. 1 is pioneering the use of a-c power in Alabama mining. A-c power, distributed by a Westinghouse system, has helped improve mining operations. All coal produced at the mine is shipped on special railroad cars to SEGCO's new steam generating plant at Wilsonville, Alabama.

J-96154-2



On-the-spot-power underground at Mine No. 1 is provided by enclosed, portable Westinghouse power center transformers which carry high-voltage current very near the active face of the mine. Voltage losses are low, machine operation more efficient. At left, electric undercutting machine in action. At right, mine chief electrician and C. J. Dornbusch, Westinghouse Sales Engineer, inspect power center. Safety disconnect switch is in background.

DIRECTLY AT THE WORKING FACE IN ALABAMA MINE

In the new Southern Electric Generating Company (SEGCO), Mine No. 1, at Parrish, Alabama, underground equipment steadily bites through the coal seams at top efficiency. Reason: the mine is the first large Alabama mine to use a-c power which permits high voltages to be carried right to underground work areas with minimum power loss. The mine receives uninterrupted power through a carefully planned and coordinated Westinghouse distribution system.

STANDARD WESTINGHOUSE EQUIPMENT makes up the mine's power system. A main 3750-kva substation reduces incoming 44,000-volt power to 12,400 volts. Auxiliary substations step power down to proper voltages for the ventilating fan, pumping station, conveyor system power center, maintenance shop and bathhouse.

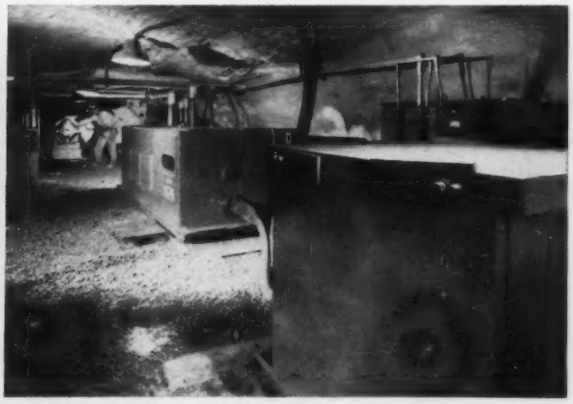
One Westinghouse 500-kva and two 1000-kva surface substations supply 4160-volt power to underground facilities. This power is stepped down to 440 volts by underground power center transformers. Because these small, lightweight, portable centers are easily moved, they can be kept near the machines they serve to deliver power over short distances at full working voltage. Other Westinghouse underground equipment: portable load break disconnects and switchhouses for maximum protection of miners and equipment.

The a-c power supply equipment, because it is simple, rugged and has few moving parts, requires less maintenance and supervision than complex d-c apparatus. Generally costs less, too. *(cont.)*

Westinghouse

J-96154-3

Power for mine trolley is supplied by this 150-kw Westinghouse silicon rectifier which converts a-c to d-c. Track haulage system transports men and materials through main haulage entries. Rectifier requires little space, needs minimum maintenance and offers highest continuity of service and reliability.



Power for conveyor is supplied by a 500-kva Westinghouse underground power center protected by a 5-kv safety disconnect switch (foreground). At rear, mine chief engineer inspects a 225-hp Westinghouse Life-Line® "H" motor which drives crusher conveyor.

WESTINGHOUSE EQUIPMENT PUTS POWER IN ALABAMA MINE... (*cont.*)

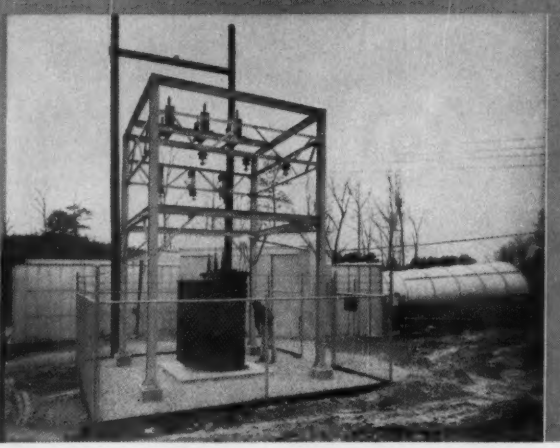
This mine commenced production in August, 1959, now has five of nine projected sections producing about 5000 tons of coal daily. In reserve: necessary Westinghouse equipment to meet future power demands.

THIS RELIABLE POWER SYSTEM is the foundation for boosting coal production. To help mine operators attain this goal, Westinghouse has inaugurated a new concept called *Progressive Automation*. It is a long-term, step-by-step plan leading to economical automatic production. Your nearby Westinghouse representative is ready now to help you formulate your individual *Progressive Automation* plan. Contact him today . . . or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. You can be sure . . . if it's Westinghouse. J-96154-4

Westinghouse

Power for mining sections is provided by three Westinghouse substations which send 4160-volt a-c current through cables to underground transformers. The Westinghouse distribution system is designed for maximum flexibility so that power can be delivered over shortest possible distance as operations expand. Above, mine engineer checks nameplate at one substation.

Power for ventilation fans is supplied by this 500-kva Westinghouse substation. Substation has the remarkable new Westinghouse-developed Insuldur® insulation system which withstands higher operating temperatures with no additional loss of insulation life.



News Roundup *(Continued)*

Blackwater River, Tucker County, W. Va., into an unusually large cooling pond. This location was decided upon because of the large amount of coal readily and inexpensively available in the area.

Monongahela would mine no coal itself, but purchase it from private contractors. With $40 million planned as the original outlay, the firm would build the dam and a generating station with one unit, to start with.

It is expected that when Unit I does begin functioning, it will require a million tons of coal annually. The company would produce a rated 250,000 kw at the unit and expects as the need arises it could expand this generating site to a million kw through addition of extra units.

The company has most of the land purchased which it will need for the dam, buildings and other facilities. It is banking on the new capacity being needed on the basis of expected family and industrial growth. However, actual building will "take its turn in the construction program of West Penn Electric," a spokesman said. He estimated the West Virginia job probably ranks second or third in the system's wide list of major projects upcoming.

Plans Coke Plant

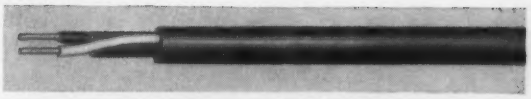
The Peabody-Wright Corp., jointly owned by Peabody Coal Co. and Curtiss-Wright Corp., will build a chemical coke plant at Columbia, Tenn., and may have it in operation by the end of the year, according to the subsidiary firm.

Most of the products will be used by existing chemical companies in Columbia, said Vaughn Mansfield, assistant vice president of Peabody. He said the plant would be adjacent to the Hooker Chemical Co. operations and that Hooker will be one of the purchasers of the chemical coke, to be used in the production of elemental phosphorus. Coal tar and other by-products may be shipped to other parts of the country, according to Mr. Mansfield.

Construction was to get under way as soon as possible. The firm could not pinpoint the groundbreaking date, but expressed hope the plant would be ready for operation by January, 1961.

Mines, Companies

Union Carbide Corp. has taken an option on 9,000 acres of land just north of Buffalo to explore coal deposits in the area. The firm did not disclose what specific project it was considering in the



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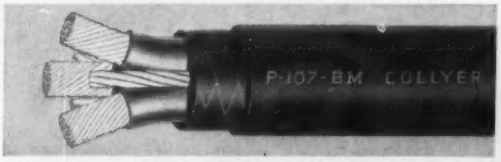

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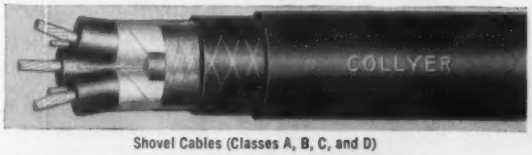

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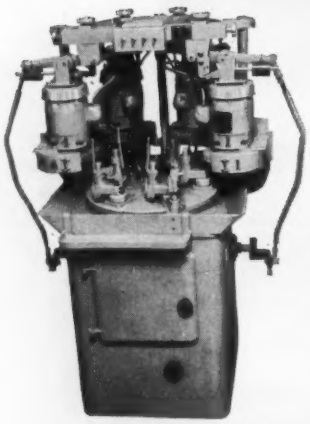

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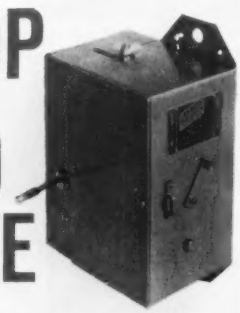

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News Roundup *(Continued)*

Buffalo area, but said it "will explore the extent of coal underlying the M&M ranch and run analyses of its quality to determine the commercial value of the coal." Union Carbide has been doing considerable research in developing use of products from coal tars. The land on which the firm obtained an option adjoins the holdings of Reynolds Minerals Corp., which has been doing experimental work in the area for 6 yr. Reynolds is believed to have been considering the feasibility of constructing an aluminum plant in the Buffalo area, using the vast low-grade coal deposits and water from Lake DeSmet.

State Mine Inspector M. J. Duzik has launched a program to seal and close some of Wyoming's abandoned coal mines. The shafts are being closed and some entrances buried as a safety factor, he said. In late August, 28 shafts were closed in the Rock Springs area, including 16 shafts at the old Ludwig mine and Peacock mine at Rock Springs and 12 openings at the former Colony mines at Dines. The Colowyo Coal Co. owned all the properties sealed up.

The Chesapeake & Ohio Ry. merger with the Baltimore & Ohio R.R. moved towards a successful conclusion in mid-September. Walter J. Tuohy, C&O president, said, "Substantial economies can, in the opinion of C&O management, be effected and the net income increased through coordinated operation under common control."

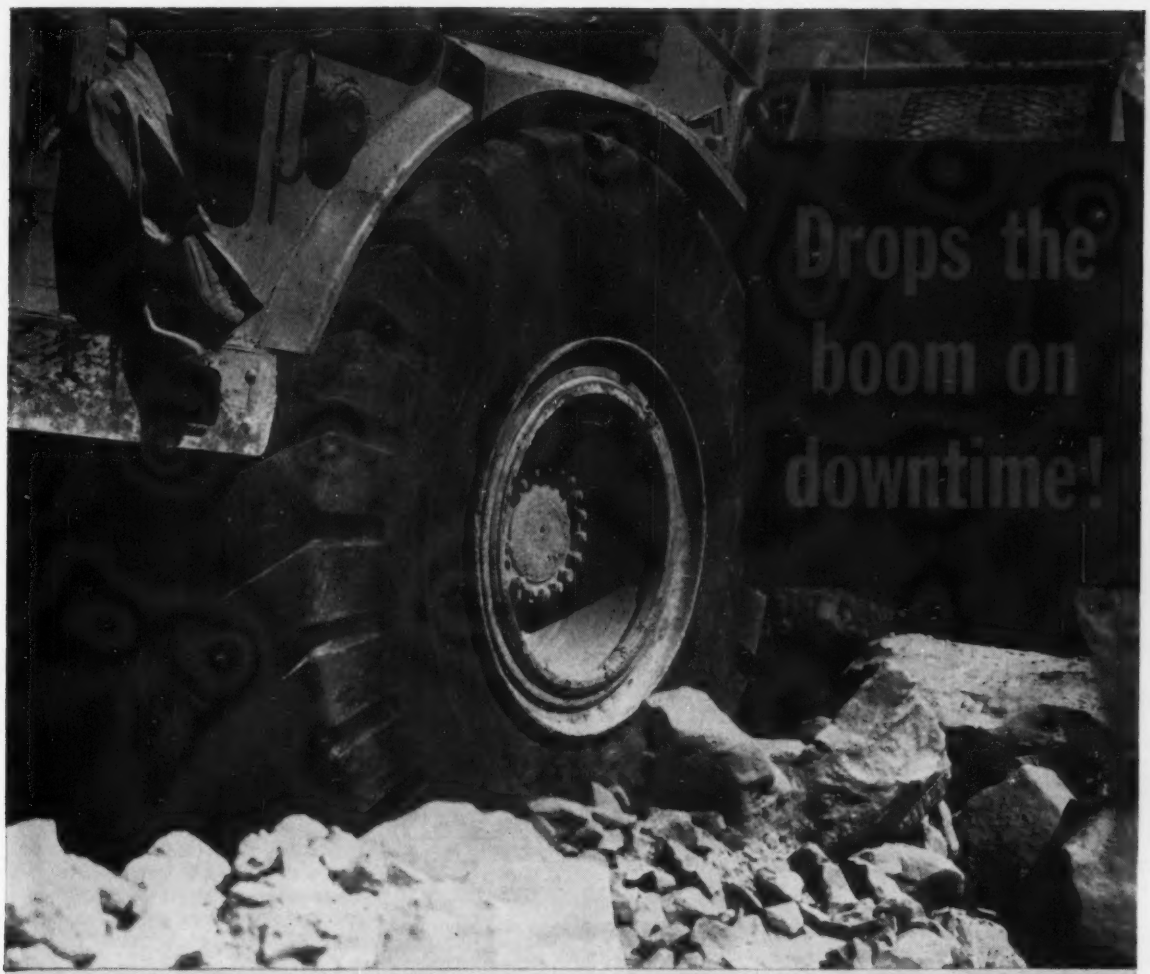
Late in September, full-scale merger of the Hudson Coal Co. with the Glen Alden Corp. appeared imminent. Negotiations were reportedly practically completed with further meetings scheduled for discussion of minor details. Merger was expected to result in realignment of top executive personnel of the two large anthracite companies. Joint occupancy of certain facilities for increased economy, Hudson Coal Co.'s excellent marketing force and interest by Glen Alden in Hudson's large tax loss were cited by some observers as key reasons for the merger.

Columbia Iron Mining Co., subsidiary of United States Steel Corp., has started exploration of coal lands in the southeastern corner of British Columbia. Work is being carried out under an agreement with the owner of this land, Crow's Nest Pass Coal Co. First phase of the 4-yr program involves extensive diamond drilling and driving of adits on coal seams to obtain samples. If and when work reveals coal of desired quality and in sufficient quantity to meet contemplated U. S. Steel expansion demands on the Pacific coast, Columbia will have the right to buy the lands from Crow's Nest for $10 million.

Work began recently to raze the River-Slope tipple of the Knox Coal Co. Port Griffith, Pa., where 12 men died Jan. 22, 1959, when the Susquehanna River crashed into the underground corridors. At the time of the break-through, there were 82 men at work underground, of which 38 escaped unassisted and 32 others were rescued. Main openings to the Knox workings were at River-Slope and at the May shaft, several blocks east. The coal pocket was used by Knox to temporarily store coal as it was hauled from the underground chambers.

Utilization

Coal receipts at TVA steam plants totaled nearly 18.9 million tons during the 1960 fiscal year, TVA reports. This was about a third of a million tons more than was consumed at the plants, raising stockpiles to 5.1 million tons. TVA said that nearly 20 million tons is expected to be consumed at the plants in the current fiscal year. Of the coal received at the plants, 10,391,056 or 55% was delivered by rail, 5,213,457 tons or 27.6% by a combination of rail-barge, 1,903,-



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News Roundup *(Continued)*

155 tons or 10.1% by barge and 1,377,249 tons or 7.3% arrived by truck. Of the 18.9 million tons received at the plants, 1.1 million tons or 6% came from east Kentucky fields, 8.5 million tons or 45% came from west Kentucky, 4.3 million tons or 23% came from Tennessee, 3.4 tons or 17.5% came from Illinois, 1.7 million tons or 9% came from Virginia and a small amount came from Alabama.

Pacific Power & Light Co. will ship a 60-ton sample of sub-bituminous coal from the Eden Ridge field it mapped in studies for a projected 100,000-kw steam electric plant, to the Colorado School of Mines for a new series of laboratory tests. E. Robert de Luccia, PP&L vice president and chief engineer, said the studies will look into by-products from the combustion of the coal and possible use of the coal as an industrial raw material as well as fuel. PP&L's geologic explorations covered a 5,000-acre area near the south fork of the Coquille River, in coastal southwestern Oregon. The utility plans an ultimate combined hydroelectric and steam-electric project with combined capability of 189,000 kw.

Coal consumers will be asked for suggestions on making the fuel competitive with natural gas in Ontario, Canada, in a survey by coal-handling companies and railroads. The survey was decided on as a first step in meeting competition from gas, at a meeting of 10 United States coal-hauling railroads, the Canadian Pacific R.R., the Canadian National R.R. and the Canadian Commercial Coal Dock Operators' Association. Every possible action should be taken to make coal competitive with natural gas in the province, the meeting decided.

Public Service Co. of Colorado has contracted to purchase 1½ million tons of coal from the Rosebud Coal Co., Hanna, Wyo. The coal will be delivered principally to the utility company's steam generating plant in the Denver, Colo., area. The contract runs over a period of 6 yr.

Steel Co. of Canada says it is considering using Canadian natural gas instead of United States coking coal in its blast furnaces. A Stelco spokesman confirmed a report that the industry is considering introducing jets of natural gas into blast furnaces to cut down on the amount of coke used and increase the capacity of furnaces. However, neither Stelco nor the Dominion Foundries & Steel Co., also considering use of natural gas, would say whether they have made arrangements to start tests on the new process. A spokesman for Trans-Canada Pipe Lines, Ltd., large Canadian gas firm, said if the two companies turned to natural gas, it would provide the biggest single industrial market for Canadian gas.

Labor Relations

A special United Mine Workers union team is investigating conditions in the union's District 23. The UMW national office sent in Henry Allai, president of District 14 and 15, in Pittsburg, Kan., and Louis Austin, a member of the union's international board from District 11, Terre Haute, Ind. The investigation was promised after a series of union meetings, led by Rev. William Mahan, demanded restoration of hospital benefits and a free election to choose District 23 officers. It is reported that the union's recent no work-no card cut off an estimated 3,500 Kentucky miners from free hospital benefits. Several District 23 locals adopted a resolution calling for immediate restoration of hospital cards. Another resolution requested an election, by secret ballot, to name officers for the district. As a provisional district, the western Kentucky group has its officers named by the national UMW office.

United States District Judge, Robert

L. Taylor, awarded three Jellico, Tenn., coal firms judgments totaling $479,000 against the United Mine Workers. Judge Taylor ruled the union was responsible for violence against the firms during contract negotiations and union organizing drives in the coal fields in the spring of 1959. Union officials denied any knowledge of the alleged violence or claims by the companies that UMW members intimidated their workmen. The firms and the amounts awarded each were: Gilchrist & Sons Coal Co., $239,000, compensatory and $79,000 punitive damages; G&R Coal Co., $20,000 compensatory and $7,000 punitive; and Randolph Coal Co., $101,000 compensatory and $33,000 punitive. The UMW is expected to appeal.

Mrs. Virginia Collins, owner of a coal mine at Bellcraft, Ky., was awarded a total of $104,850 in judgments against the United Mine Workers Union in a federal court in Pikeville, Ky. The court awarded Mrs. Collins $54,850 for damages to a bridge leading to her coal mine which was blown up June 20, 1959. An additional $50,000 was granted as punitive damages. The union will appeal its attorneys announced.

Safety

The Dept. of the Interior announced that the Bureau of Mines has published detailed tentative safety recommendations for field-mixed ammonium nitrate agents. The recommendations, said bureau director Marling J. Ankeny, are designed to promote safety "without making operations so burdensome as to lose the basic advantage of lower costs" in the use of ammonium nitrate blasting agents. Because of the tentative nature of the recommendations, Mr. Ankeny said the bureau cautions against their legal adoption in present form by state and local governmental agencies. A copy of the bureau's publication, Information Circular 7988, can be obtained from the Publications-Distribution Sect. Bureau of Mines, 4800 Forbes Ave., Pittsburgh 13.

The Bureau of Mines has revised Schedule 2F as it applies to use of trailing cables in underground coal mines. Under certain conditions, the new regulations will permit the use of trailing cables up to 1,000 ft in length. No more than five temporary splices are permitted in such cables, however, and short-circuit protection is required. Anyone interested in obtaining a table showing permissible lengths and other specifications for trailing cables in excess of 500 ft may do so by writing to the American Mining Congress, 1102 Ring Bldg., Washington 6, D. C.

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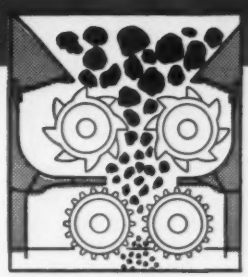

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Society of Mining Engineers meets in St. Louis to discuss . . . .

Shaft Sinking, Stripping, Coking Coals and Stream Pollution

SHAFT SINKING AND LINING in the southern Illinois coal field, the adaptability of Illinois coals for metallurgical use and stream pollution highlighted the joint meeting of the Coal Div., Society of Mining Engineers and the St. Louis Sec., AIME, Chase Hotel, St. Louis, Sept. 8-9. Other key topics at the two-day meeting included the relationship between stripping-machinery mass and overburden volumes, Oklahoma-Arkansas coals, fluorspar mining and Meramec Mining Co.'s Pea Ridge project.

H. E. Mauck, vice president, Freeman Coal Mining Corp., was chairman of the Thursday morning technical session. H. O. Zimmerman, Inland Steel Corp., and Larry Cook, Ohio Reclamation Association, were co-chairmen of the Friday session. Following are abstracts of the papers on coal:

Shaft Sinking and Lining in the Southern Illinois Coal Field, J. W. MacDonald, vice president, engineering, Old Ben Coal Corp., Benton, Ill.

Two coal shafts recently completed in Franklin County, Illinois, provide access to a tract with a potential recovery of 100 million tons of coal. This work was the first sinking done by the company forces since 1918.

Core test holes were drilled within each of the two shaft locations. Four additional cable-tool holes were drilled on a radius of 700 ft from the shaft to determine coal elevation for planning the underground layout at each shaft. A very soft sandstone was found at 16 ft. Gradation from very soft to fairly hard occurred within the next 14 ft.

The hoisting shaft, oval-shaped and measuring 11x20 ft, was sunk 666 ft to the base of the coal and extended 90 ft to the bottom of the sump. An adjacent concrete-lined hopper holds 100 tons and feeds 10-ton skips.

The air and material shaft is 19 ft 9 in by 30 ft. Provisions were made to facilitate delivery of shuttle cars and 28-ft mine cars by suspension under the deck of the material cage.

The two shafts entailed removal of 58,000 tons of materials and required 82,350 lb of powder. Ready-mixed concrete for lining the shafts was purchased from a plant 4 mi from the shafts. A 1:2.04:3.28 mixture was required. Sinking normally was extended 43 ft before lining unless prevented by weak material.

A crew of seven men poured 18 ft of lining in each of the 37 days required for completing the lining. Installation of partition walls required 5,899.25 hr. Use of slip forms in the larger shaft proved advantageous.

High early-cement grout injection sealed off water in the air and material shaft. It did not reduce inflow sufficiently in the hoisting shaft. As a consequence, the Halliburton Grouting Service was engaged to assist and direct chemical grouting. Two chemical injections provided an 83.5% reduction in water inflow. It now is 0.19 gpm.

Stripping Machinery, Mass-Overburden Volumes Relationships, Henry Rumfelt,

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in strip mine operations
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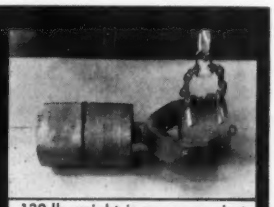
130-lb weight is swung against SAF-T-BOOST taped to a steel block. In over 100 tests, SAF-T-BOOST did not detonate.

30-lb. weight is dropped from height of 40 feet onto SAF-T-BOOST taped to steel plate. In this test, SAF-T-BOOST has never detonated.

SAF-T-BOOST is placed on wood excelsior and ignited. SAF-T-BOOST burns completely without detonating.

Bucyrus-Erie Co., So. Milwaukee, Wis.

The trend in the coal industry is to increase the proportion of production that is obtained by strip mining. Another significant development is that the depth of overburden considered suitable for stripping is increasing. Today a depth of 80 to 100 ft is frequently taken into consideration for simple overcasting operations.

With these changes there have been continuing studies for procedures to economically treat the deeper stripping problems. In nearly every instance a sufficiently large machine that would accomplish the task by simple overcasting was indicated where the reserves were sufficiently large. The only known practicable way to evaluate accurately a proposed stripping venture is to construct studies, including cost estimates, step by step. Nevertheless a quick method for making appraisals for preliminary evaluations and orientation purposes has been in demand.

The approach to the problem of finding a preliminary simple overcasting analysis for a stripping project employs indicated trends in the relationship of the weight of the machine to its ability to do work. The ability to do work is established through MUF numbers. Also the approach employs situations where the geometry of each cut and spoil section is assumed to take certain defined relationships for varying overburden depths. Slopes are considered to be stable.

The MUF_s for any shovel is defined as the product of the nominal size of the dipper in cubic yards and the dumping reach. The MUF_d for a dragline is defined as the product of the nominal bucket size and the dumping reach. The required MUF for a shovel or dragline may be obtained by substituting known values in equations. Curves also are employed in the analysis.

The Adaptability of Illinois Coal for Use in Iron and Steel Production, H. E. Risser, mineral economist, Illinois State Geological Survey, Urbana, Ill.

Adaptability, as used in this context, means that a coal can be adapted to use within a given technological and economic framework. Illinois coals can be used, and are being adapted to use, in the production of metallurgical coke. At one time state coals were not considered suitable for such use. Today Illinois coal is being used in steadily increasing quantities by the steel industries of Illinois and Indiana. The circumstances and factors which have led to its acceptance are presently being strengthened by a number of important trends that are expected to result in much greater use of Illinois coals for this purpose in the future.

The growing use for metallurgical coke can be attributed to three things:

1. Establishment of the fact that by proper blending of Illinois coal a coke possessing adequate strength and stability for blast furnace use can be obtained.

2. Product improvement by the coal producers.

3. Economic trends favoring the use of Illinois coal.

Since the beginning of the Illinois State Geological Survey's research program in 1943, a continuous program has been carried on. Most of the blends used experimentally have combined Illinois coals with coals from the low-volatile fields of West Virginia and the high- and medium-volatile fields of eastern Kentucky and southern West Virginia.

From the many tests performed a number of general observations with regard to the use of Illinois coals can be made:

1. Illinois coals definitely can be sub-

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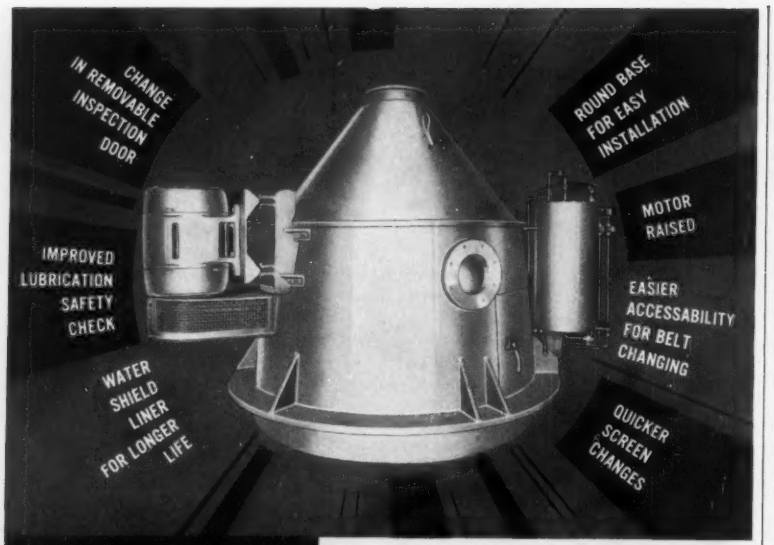
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The 1960 EB-36 Dryer is a precision-built, excellently machined, dependable dryer which will reduce 35% surface moisture in coal to less than 5% at the rate of 65 tons or more per hour.

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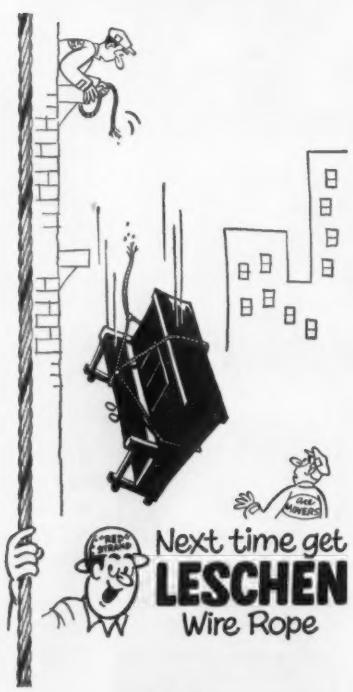

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stituted for eastern high-volatile coking coals to produce a satisfactory grade of metallurgical coke.

2. Addition of Illinois coal tends to increase the stability of cokes made with eastern Kentucky coals. It has but little effect either way on cokes made with high-rank West Virginia and Virginia coals.

3. Coke size is not appreciably affected by the use of Illinois coals, except that the percentage of fines is reduced.

4. Illinois coals consistently reduce the apparent gravity of the coke produced.

5. Illinois coals exert relatively low expansion pressure when coked.

6. Illinois coals contain somewhat more sulphur than most of the eastern coking coals tested. This disadvantage is partially offset by the fact that Illinois coals tend to lose more of their sulphur during carbonization.

7. Coke yield is lowered to some extent by use of Illinois coals because of the higher moisture content and, in some cases, by higher volatile content.

8. In some blends the by-product yield is decreased by the use of Illinois coals.

The tests upon which the foregoing observations are based have been described in several reports published by the Illinois State Geological Survey.

Oklahoma-Arkansas Coals, B. L. Curry, safety engineer, Lone Star Steel Co., McAlester, Okla.

The Oklahoma coal field is in the eastern third of the state and is continuous with the Arkansas field on the east and the southeastern Kansas field on the north. At present the major use of Oklahoma-Arkansas coals is for metallurgical purposes.

The coal fields are adequately served by a network of several railroads and are accessible by state and federal roads.

Important mineable seams in Oklahoma are: Dawson, Henryetta, Witteville, Cavanal, Stigler, McAlester and Hartshorne. Mineable seams in Arkansas are: Paris, Charleston and Hartshorne.

Rank varies from semianthracite in Arkansas to high-volatile bituminous in the western part of southern Oklahoma. Ash content ranges from 4.2 to 13.3%, sulphur content ranges from 0.8 to 4.3%, and Btu varies from 12,460 to 14,430.

Oklahoma coal reserves are estimated at about 3¼ billion tons, mostly high volatile. Arkansas reserves are estimated at about 2 billion tons and are mostly low volatile. There is a need for continuing research to broaden the markets for these coals.

Lone Star Steel operates two mines in Oklahoma. Carbon No. 5 mine produces coal from the high-volatile McAlester bed 38 to 42 in thick. Lone Star No. 14 produces coal from the Lower Hartshorne seam, about 4 ft thick. All coal from the mines, plus a considerable volume of purchased coal, is shipped by rail to the by-product ovens at the steel plant in Lone Star, Texas.

Stream Pollution, C. W. Klassen, chief sanitary engineer, Illinois Dept. of Public Health.

Water is a multiple-purpose resource in the Midwest. It is vital to municipalities, much is used for irrigation and its use in industry is growing. It is important that no special group be given privileges not granted to other groups.

The objective of a pollution-control program is to secure and maintain water in a state that will not be detrimental to the users. The goal in an industrial program is to prevent pollution. But one important consideration is to determine if anything can be done with the waste going into a stream. In some cases industry has been able to market profitably products recovered from waste.

The state agency should tell industry what it is doing to a stream. Industry then must solve the problem. If industry does not solve the problem it has not studied it thoroughly enough or has not spent enough money on the project. The cost of such work should be considered as part of production cost.

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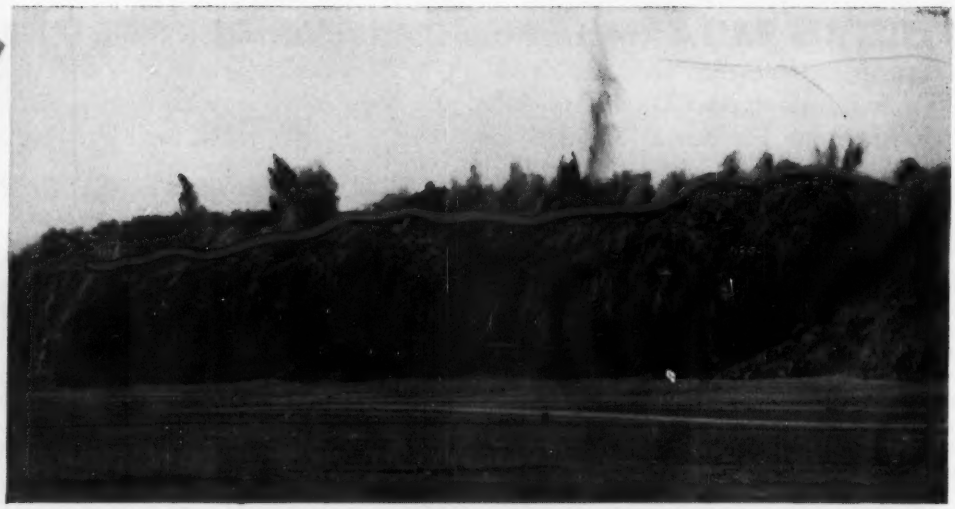
Rescue and recovery work is a tough, demanding job. It takes a highly trained team of men to carry out this vital task. And, to operate at top efficiency, a team requires quality, time-proven equipment.

Developing this equipment was the single idea that started MSA as a company. And, we continue to search and research to make the best possible, and most complete line of protective equipment available. In respiratory protection alone, MSA has contributed the McCaa,® the Chemox,® the All-Service® Mask and the Self-Rescuer.®

Our newest product for rescue and recovery work is the Rescue Communications System. It meets the need for continuous "party line" communications between rescue team and fresh air base. It is a talking life-line that conveys vital information immediately.

For detailed information, contact your MSA Representative. Or write, Mine Safety Appliances Company, 201 N. Braddock Avenue, Pittsburgh 8, Pa. In Canada: Mine Safety Appliances Company of Canada Ltd., 500 MacPherson Ave., Toronto 4, Ontario.



This unretouched photograph shows a multiple hole blast detonated with Primacord, and hooked up with Primacord M/S Connectors in the trunk line. Note the steady progress of this blast from the point of initiation at the left as indicated by the red line.

Millisecond Delay Blasting with Primacord and

PRIMACORD M/S CONNECTORS

can provide you with these 8 advantages:

One of the primary purposes of millisecond delay is to provide relief between holes or rows of holes. When properly relieved, each succeeding charge "takes the line of least resistance." This condition usually results in

1. Less explosive required than for comparable instantaneous blasting.
2. Better fragmentation.
3. Less vibration and concussion.
4. Better control of throw or displacement.
5. Reduction of "toe" and undesirable backbreak.

Primacord will initiate all cap-sensitive explosives, but is insensitive to detonation by stray electrical currents, sparks or ordinary shock. When Primacord is used for all in-hole priming and to connect all holes, you have these additional advantages:

6. The work of loading the blast can follow the drillers. The holes can stand loaded and Primacord primed until everything is ready for the blast.
7. Danger of a premature blast is minimized. You detonate the Primacord trunk line with fuse and cap or electric blasting cap attached *only when all is ready for the blast.*
8. Less chance of missed holes with unexploded powder and caps in the muck.

The Primacord M/S Connector is a non-electric delay device. It consists of a metal tube containing a delay element in the center with a series of adjacent charges at each end. A piece of Primacord about 12" long is crimped onto each end of the metal tube. The Primacord M/S Connector is constructed symmetrically about the center and therefore functions in either direction. The Connectors are used by simply cutting the Primacord trunk line at the spot where the delay is desired and tying the Connector to the cut end of the Primacord trunk line with a square knot. Primacord M/S Connectors may be obtained for three different delay periods: 5, 9 and 17 milliseconds. They are packed 50 in a cardboard tube, 500 to a case. Manufactured by E. I. duPont de Nemours & Company. Available through all explosives suppliers.

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Devoted to the Operating, Technical and Business Problems of
The Coal-Mining Industry

COAL AGE

OCTOBER, 1960

IVAN A. GIVEN, EDITOR

Coming Approach

IT WAS NOT MANY YEARS AGO that 15 tons per man in the bituminous industry looked a long way off. Now it is almost immediately ahead—not in 1960, but a good chance in 1961 and certainly by 1962 at the latest. In other words there has been an acceleration in progress, though inevitably the law of diminishing returns will begin to operate and the curve of output per man will flatten out. The flattening will not be soon, meaning not earlier than five years from now and perhaps ten or more. The production concept is the key. If it changes as is logical and necessary the date when little or no additional progress can be economically made will be pushed back into the more-distant future.

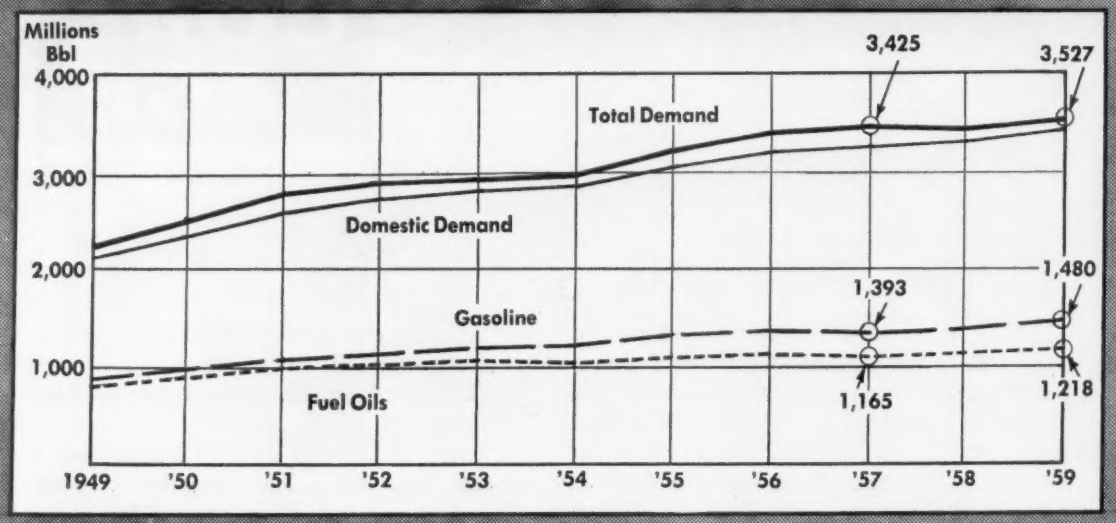
What is embraced in this concept? For one thing output should be based on development of a production and handling system stretching from the face to the beginning of the mine-to-market transportation system. Some might feel such systems already are available. Actually, however, the production setup so far is more a collection of individual units combined in a reasonably workable pattern. Some units have failed to carry their share of the load in the past—and in some instances, in the present—witness the still-great emphasis on transportation behind face units.

When you get right down to it everything is equally important in the mining, transportation and processing cycle. If one element fails or has not the requisite capacity the entire system necessarily operates at less than potential capacity, with corresponding effect on costs. Thus, for the maximum in tons per man, meaning the ultimate in performance and cost, coal production must be looked at as one integrated process from face to car, barge or pipeline—in other words a complete system rather than a series of separate and independently considered activities. You don't buy a locomotive or conveyor, you buy transportation, as an example. The end of thinking, design and purchase should be a system rather than a collection of individual specialized units. This is the coming approach to maximum productivity in coal mining. In fact, a start has been made and the evidence already is that the payoff is most worthwhile.

Mines for Tomorrow

AT FIRST GLANCE one might be inclined to say that in these recession days for coal as well as for other key industries no new mines are being opened. A closer look, however, forces a revision in such snap reaction, with the conclusion that 1960, surprisingly enough, is a year of significant activity in new coal-producing properties, though by no stretch of the imagination is it a peak year.

What about 1961 and the farther future? Coal production inevitably must climb, with especial emphasis on output in certain hitherto unencouraging areas—the Rockies, for example. At even the reduced rate of slightly over 400 million a year for bituminous, mines work out even if they are not forced out because of age, adverse natural conditions or failure to keep up the productivity pace. Thus, though total output may not exceed 525 to 550 million in 1965, meaning only a modest rise in total tons per year, satisfying even this modest level of demand will necessitate a significant number of new properties in the years immediately ahead, not to mention the need for preparing for even higher requirements in the period beyond 1965. And the new properties, in the right places and properly equipped and managed, will mean not only higher profits for their owners but an even solider position for coal where it counts—in the marketplace.



Adapted from USBM data

GROWTH in total annual demand for oil products during the past decade fell from 5 to 4%. This year's rate, estimated at 3 to 3.5%, is expected to set the average pace for the sixties. As companies strive to stabilize market structure . . .

Outlook: Coal vs Oil

No evidence crops up to show oil is planning any new offensive on coal markets. But other adjustments to a slower rate of demand growth will stress . . .

- Solving the problem of oversupply.
- Programming refinery output for most promising profit-making opportunities.
- Developing new uses and markets.
- Minimizing political interference in the free competitive market system.

W. A. Raleigh Jr.
Associate Editor, Coal Age

OIL is not likely to turn up any unexpected trump cards against coal during the immediate years ahead. This is *Coal Age's* main conclusion after checking with petroleum economists to determine whether the slowing down in oil's annual growth rate (above) might spur it to further penetration of coal's industrial and commercial markets.

Petroleum economists generally refer to the slowing down of oil's annual growth rate as a return to "normal" demand—normal being pegged to the Nation's growth rate in demand for energy, which averages about 3% annually.

During the past decade annual growth in overall demand for petroleum products slid from 5 to 4%. Now most of the industry's analysts look for this year's estimated growth rate of 3 to 3.5% to set the average pace for the sixties.

The higher growth rate of the fifties resulted mainly from excessive gains which oil made, at the expense of coal, in railroad and space heating markets. Virtually all such gains have been achieved and no similar-type opportunities are seen on the immediate horizon. Thus, growth for at least the next 5 yr—and possibly the next 10 yr—will be based primarily on the usual factors supporting energy growth including population increases, higher per capita consumption, greater industrial output and expanded transport.

The most progressive petroleum companies recognize, however, that cashing in on the Nation's energy growth will not be automatic. Return to a "normal" growth rate is certain to breed more aggressive selling effort among individual oil companies as each strives to capitalize on sales opportunities, or prevent losses, in a changing pattern of energy demand. It will also stimulate more emphasis on development of new uses and markets. A stiffening attack against natural gas may also be shaping up but no drastic change in approach to coal competition is foreseen.

JET FUEL sales volume, due for tenfold increase by 1965, will be one answer to overall slow-down in oil demand. Other answers: more aggressive selling of gasoline and distillates; a new push on petrochemicals and research.

Competition: Oil vs Coal

Top Battle—Hottest current competitive clash is between coal and a handful of U.S. international oil companies over imports of residual oil used mainly as a boiler fuel by electric utilities, and chiefly in the Eastern Seaboard areas. While the battle rages on, however, with each side vying for the competitive edge on the Interior Dept.'s quota rulings, sober-minded petroleum economists are making comments which run, in substance, as follows:

• Coal is much too worried about imports of residual. The real villain is not oil but natural gas, which is poised for a major invasion of northeastern industrial markets. Note, for example: In the Philadelphia and New York City areas, where all three fossil-fuels compete heavily, average 1959 costs of natural gas per million Btu "as consumed" at electric power plants were, respectively, 31.1c and 34.3c; comparable coal and oil costs ranged from 34.9c to 37.7c.

• Even if coal succeeds in cutting down imports of residual oil, or knocking them out completely, natural gas will probably fill the vacuum of needs —as long as the Federal Power Commission controls wellhead prices of natural gas, permits interruptible gas sales, and approves Canadian imports of the product.

• Within 10 yr, there probably will be no domestic production of residual for heavy fuel oil markets. The trend in recent years has been away from such production and it will continue. Sales of domestic residual are just plain uneconomic—the profits aren't there. U.S. oil companies will be much more interested in re-running the product through refineries for upgrading into coke and light-oil products which have a higher profits-base.

• Current price relationships between coal and residual oil provide no incentives for domestic producers to expand output of the product. In 1959, the average FOB plant price of 1 ton of utility coal in the Phila. and N.Y.C. areas was $9.52 and $10.10, respectively. Comparable prices for oil were $10.06 and $9.37, figuring 4.3 bbl of oil as the Btu-equivalent of one ton of coal and average FOB-plant prices of oil per bbl in the Philadelphia and New York areas at $2.34 and $2.18, respectively.

Against this competitive price range ($9.37-$10.10) where the delivered price of oil was running under $2.35 per bbl, consider the fact that the average wellhead price of U.S. crude in eight principal-producing areas was $3.03 in 1959. Thus, the FOB-plant price of residual oil would have to move up quite sharply, say to the $4 to $5 price range (allowing for processing and transport costs), before its market would really become attractive to domestic producers. This order of price increase is most unlikely as long as the Interior Dept. unofficially controls ceiling prices on residual through policing the import quota system. And, if such controls were not in the picture, residual prices could not go much higher anyway and still meet rugged competition from coal.

Other Competition—In the general industrial and commercial market (manufacturing establishments, office buildings, apartment houses, greenhouses, etc.), coal's main problem is not oil or gas but lack of industry-wide competitive selling effort. As pointed out by *Coal Age*, (November, 1959, p 70):

"A major overhaul in merchandising approach to the industrial and commercial market is urgently needed if coal is to capitalize on its opportunity here and stem the grim prospect of continued sales erosion . . .

"Oil and gas suppliers and equip-

ment manufacturers have focused their selling campaigns on uprooting coal's entrenchment in this market. These campaigns have paid off. But, in most cases, the payoff has not been due to superior burning equipment or to any greater merits competitive fuels offer in price and Btu value. Instead, it has resulted from coal's failure to defend and promote its interests . . . Coal companies are still selling against each other—not against oil and gas."

In 1960, Bituminous Coal Institute launched a new drive to expand sales research and market development in this marketing area. But, until the institute is able to implement its projects with full-scale cooperation and necessary manpower from individual coal companies, present trends in fossil-fuel sales should remain about the same with coal and oil fighting to retain their shares of the market agains possible increasing losses for both to natural gas.

Coal's present share of the general industrial and commercial market is put at 120 million tons; those of gas and oil, respectively, at 120 and 60 million tons of coal-equivalent. If the modern coal-burning story were adequately merchandised to all customers and prospects in this market, industry analysts estimate coal would capture 25 to 50% of the competitive fuels' share, or 45 to 90 million tons.

Adjusting to Demand Slow-Down

Although oil is not likely to pull any surprises on coal in the immediate years ahead, the industry is in the throes of making other adjustments to the demand slow-down. These bear close watching for possible effects they may have on the long-range competitive picture between oil and other energy sources including coal.

Current thinking indicates that these adjustments will stress:

1. Solving the problem of oversupply.

2. Programming refinery output for most promising profit-making opportunities.

3. Developing new uses and markets.

4. Minimizing political interference in the free competitive market system.

Oversupply Problem—Most pressing immediate need is for adjusting the industry's productive capacity to the slower rate of demand growth.

By June 3, 1960, the Chase-Manhattan Bank estimated that the petroleum industry had an excess of 52 million bbl in stocks of all oils (including crude and refined products), or about 7% more than necessary. Stocks of refined products alone, half of which were gasoline, were running 11% too high in terms of current levels of demand.

In spite of excessive refinery runs the bank's *Monthly Review of the Petroleum Situation*, published in July, noted there was some evidence of inventory correction in June as compared to previous months. But, in August, the same source glumly modified its position as follows:

"In the face of a mounting wave of amazement, concern and indignation, both within and outside the industry, refiners in July persisted in operating their plants far in excess of needs. Whatever their motive—and they must have some purpose, since the excessive rate has now been has now been sustained for almost 2 mo—it is baffling, because history has recorded often the undesirable consequences of such actions. Inevitably, the price structure eventually breaks down, and there follows a cutback in operations to correct for earlier excesses. And for the refiners, the temporary gains invariably become net losses."

Some industry analysts contend that overproduction of refinery products is a temporary situation, resulting primarily from inventory policies of distributors. Others, taking a broader view, blame the slower rate of demand growth and the failure of all segments of the industry to adjust to it. In the final analysis, one authority states, inventory goals have been set by the industry and these will be achieved "when there is a unanimous will to do so."

No matter how you slice the current oversupply problem, solutions will most probably materialize through more efficient programming of refinery output and by creating new demand through more aggressive market development and selling effort.

Refinery Programming—In terms of programming refinery output for maximum profit, past and current trends provide the best guide to the future.

There is not much doubt that gasoline, accounting for 43.4 to 44.9% of refinery yields in the 1955-59 period, will remain the mainstay of the market. But a continued leveling-off in sales is in prospect as powerful forces simultaneously work for and against greater usage.

Favoring greater usage are (1) the sustained rise in household formations due in the 1962-65 period, (2) population movement away from congested population centers to suburban areas, and (3) the trend toward two cars per family.

Working against greater usage are (1) the accelerated trend toward compact or smaller cars which consume not only less gasoline but also less profitable regular grades, (2) declining use of automobiles for non-essential purposes, such as, commuting and vacation travel, (3) higher gasoline taxes, and (4), in commercial transport, the increasing shift away from aviation gasoline to jet fuel.

Refinery yields of distillate oils increased from 17.5% of total output in 1949 to 22.9% in 1956. During the last 3 yr, however, yields have hovered within a half a percentage point of that mark. Continued leveling off in distillate yields appear, therefore, to be in the cards. Gains in sales of diesel oil for trucks will occur but these will probably be offset by losses to natural gas as this fuel penetrates further into oil's home-heating market.

For lack of profit-incentives and other reasons previously cited, further cutbacks in sales of domestic residual oil are in the offing. Yields have dropped consistently from 21.7% of total output in 1949 to 11.8% in 1959. The continuing trend will be to re-run residual through the refinery for upgrading to more profitable products.

Near-sure bets to move up the percentage scale of refinery yields are several items in the "other products" category, including jet fuel, coke, asphalt and liquefied gases. Together these products made up 9.3% of refinery yields in 1958, compared to 5.7% in 1952. All are good profit-makers and have been major ground-gainers during the past 6 yr as shown by the following table:

	Production, Millions Bbl		% Increase, '59 over '54
	1954	1959	
Liquefied gases	34	68	100
Jet fuel	47	93	98
Coke	24	41	71
Asphalt	75	98	31

By 1965, according to one recent estimate, the volume of jet fuel sold will increase tenfold; liquefied gases (used as chemical raw materials and as fuel), 100%; and asphalt (used mostly for paving or roads, driveways and airport runways), 50%. Much nonmarketable coke is used as a refinery fuel, but low-sulphur content grades are expected to have a growing market for making electrodes in aluminum production.

Market Development — Petroleum economists figure that growth in sales of jet fuel, liquefied gases, coke and asphalt will be accompanied by harder-hitting efforts to strengthen market positions of major product lines and by greater emphasis on product research.

On the major market front, a drive is reportedly in the making to reorient traditional techniques for marketing gasoline and heating oils. For example, individual oil companies, usually preoccupied with selling one brand name of gasoline against another, will seek more and more to promote overall gasoline use through stressing the pleasures of automobile travel. In the space heating market, they will intensify efforts (1) to fight aggressive competition of natural gas and electric heat, and (2) to develop more efficient burning equipment.

Petroleum economists see three main ways in which product research can contribute to market development. New or improved products can (1) offset the slowing down in demand for some normal end-uses, (2) protect against invasion of existing markets by competitive energy sources, and (3) strengthen profit-making potentials both at home and abroad.

On oil's research agenda are such projects, for example, as a new family of thermoplastics which will make multicolored road surfaces practical for the first time; improved oil-based plastics for use in construction of cars, buses and trucks; stronger and more weather-resistant asphalt for roadways; use of asphalt film to reclaim arid areas and abandoned farm lands; butyl rubber made from invisible refinery waste gases; cleaner, more efficient fuels for internal-combustion and diesel engines; the best and most economical fuel for the gas-turbine engine; lower-cost automotive lubricants; automatic transmission fluids with greater stability in varying operating conditions; permanent-type greases for chassis and suspension lubrication at the factory; new rust preventives to reduce salt corrosion; and more durable, oil-based paints and enamels.

Of particular interest to coal are research efforts aimed at greater use of petroleum in steelmaking (*Coal Age*, **September 1959, p 26), and fuel-cell development.**

Last May, for example, the Esso Research & Engineering Co. announced development of a petroleum-based fuel cell that will operate at normal pressures and temperatures. High pressures and temperatures have up to now been a serious handicap to using hydro carbon fuels in fuel cells. With these obstacles apparently overcome, Esso will seek improved catalysts and electrolytes before planning production of a commercial fuel cell. Chances are such problems will be solved and lead to fuel-cell uses in which coal might also participate. (For a review of coal's position in fuel-cell development, check the *Coal Age* feature, "Fuel Cell Prospects and Coal," December, 1959, p 75).

Political Interference — Whether planning for today's or tomorrow's markets, oil companies generally concur that a minimum of political or government interference is vital to realizing maximum growth and profit potentials. For this reason, most of the industry has opposed coal's drive for a national fuels policy and, at the same time, supported its fight against federal regulation of residual oil imports, which, in effect, has resulted in federal control of prices and profits for that commodity.

Most of the petroleum industry is showing similar consistency and growing opposition to federal controls over the interstate marketing of natural gas. Because of these controls, which include holding wellhead prices of interstate gas down to levels that do not allow for a free share of production costs, this schizophrenic situation has developed: Natural gas, usually a "by-product" of oil production, continues to outstrip the "parent" products growth in the marketplace. With increasing pain, for example, oil producers have noted how the growth rate for heating oils has dwindled to about 1% a year while demand for natural gas in the home heating market still clips along at a much faster pace.

The upshot of all: An intensified campaign apparently is shaping up to attack natural gas competition through seeking amendment or elimination of federal marketing controls over the product. The answer may come through pressing the Federal Power Commission for fairer methods of allocating production costs to oil and gas—a problem with which the agency has been wrestling during the past 5 yr. It could also come through pushing for elimination of controls on wellhead prices of natural gas—a proposal which is due to hit the Congressional docket again next year.

"Regardless of how the situation is resolved," says one experienced observer, "oil's ultimate goal is a return to the free competitive market system. If this state can be achieved, the forces of demand, supply and price will naturally set markets and marketing areas for all fuels. And chances for such achievement are not beyond imagination since compromises on federal controls have proven unsuccessful and no one wants complete federal control of energy industries, which would be infinitely worse."

Promising Prospect: Better Understanding

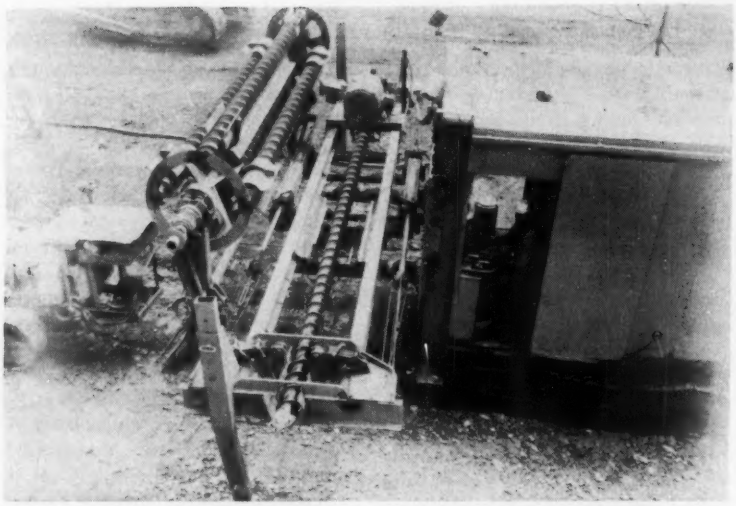
Outwardly, judging from news releases coming out of some coal and oil quarters on such matters as imports of residual fuel oil and national fuels policy, it would appear the two industries are faced with increasing animosity toward each other. Looking more deeply, however, certain more basic factors point to the possibility of a firm rapprochement of interests. These factors are:

1. No opportunities for major invasion of each other's markets appear on the immediate horizon.

2. Natural gas has become, or is becoming, the severest competitive problem for both oil and coal.

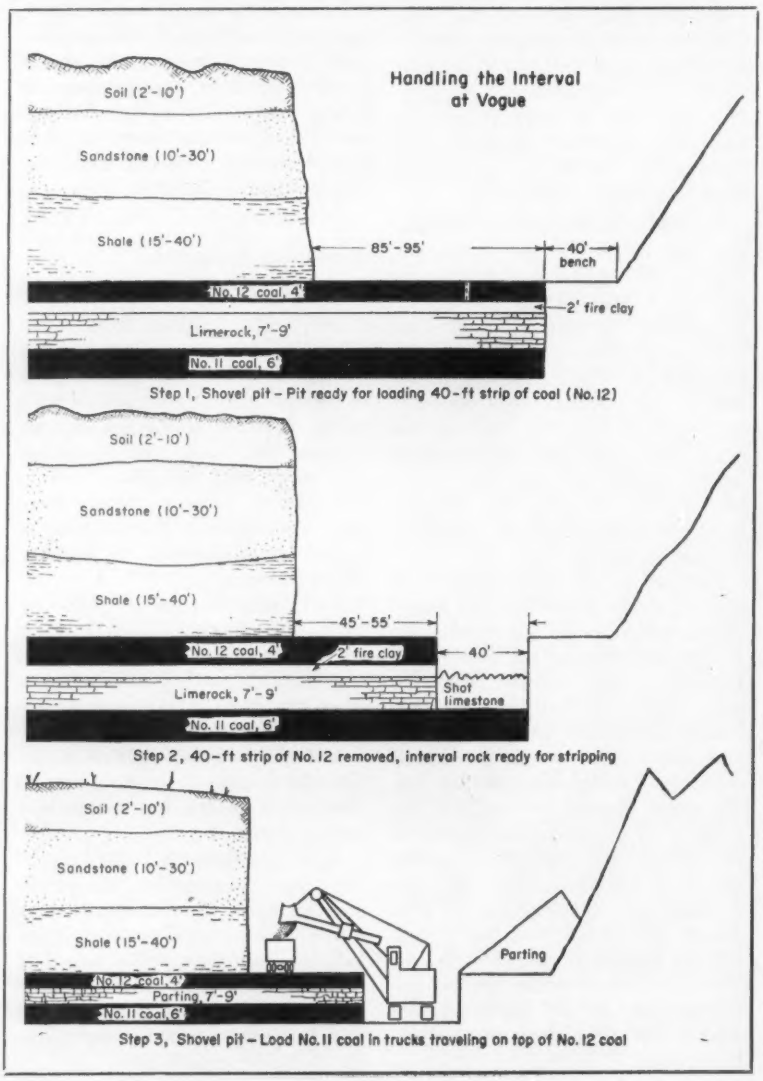
3. Both industries believe fundamentally in minimizing governmental interference in the free competitive market system.

As if extending the "olive branch" for better understanding, one petroleum executive interviewed by *Coal Age* gave this accolade to coal: "Your industry, with its enviable record of productivity-progress and peaceful labor-management relations, should have no serious concern about realizing its future growth potentials."



COMPANY-BUILT AUGER drills an average of 1,000 ft of 9-in hole per shift. Holes can be drilled up to 9 ft above coal and angled up or down up to 35 deg.

Vogue mine employs special drills, mechanical tamper and buffer shooting for effective bank preparation. Separate washing of two seams demands special loading techniques.



Special Mark Two-

Alfred E. Flowers
Associate Editor, Coal Age

EFFECTIVE BANK PREPARATION and skillful use of stripping machines are setting the stage for a record 2 million-ton year at Peabody Coal Co.'s Vogue mine, Madisonville, Ky. Output for the first 6 mo approached 1 million tons and at the present production rate should top 2 million tons by the end of the year.

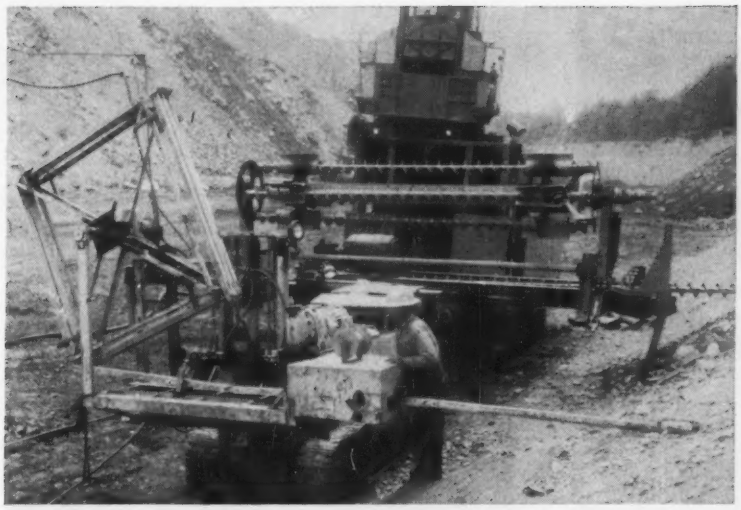
Vogue operates in the Nos. 11 and 12 seams, which are separated by 2 to 9 ft of hard limestone and 2 ft of fireclay. Overburden on the No. 12 coal includes 15 to 40 ft of shale, 10 to 30 ft of sandstone and top soil.

To handle the two-seam stripping job, Vogue employs a 14-yd dragline in one pit and a 33-yd shovel plus a 6-yd rock-interval shovel in a second pit. The mine relies on high-capacity horizontal and vertical drilling to keep bank preparation in step with stripping capacity.

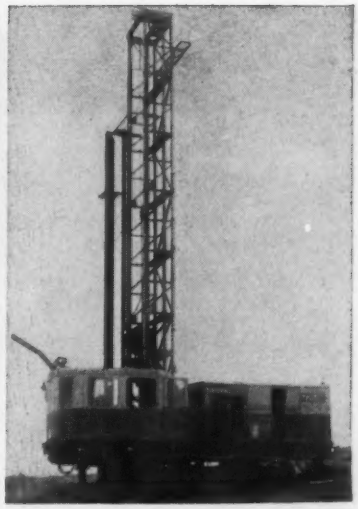
Bank preparation features include:

1. A company-built horizontal auger that drills an average of 1,000 ft of 9-in hole per shift.

2. Mechanical tamping of horizontal holes.



MECHANICAL TAMPER follows auger, pushes 50-lb cartridges of explosives and stemming into 80-ft holes. Four primers are used connected by detonating fuse.



VERTICAL ROTARY DRILL bores 10⅝-in holes in dragline pit.

Equipment, Three-Step Preparation Seam Stripping at Vogue Mine

3. Vertical rotary dry-type drilling and buffer shooting.

4. Self-propelled units with two and four air-powered drills for sinking holes in thin, hard limestone between seams.

The Vogue preparation plant yields 4,500 tons of clean coal per shift, which is prepared in three-stage jig washing. To serve customers with a wide assortment of sizes and blends, the plant has a crushing, rescreening and blending circuit in addition to the primary washing circuit. Coal moves north, south and west to market by rail or a combination of rail and water via the I. C. and L. & N. R. R.'s. Each seam is mined, washed and loaded separately.

D. C. Hall Jr., superintendent, directs operations at Vogue mine. Other members of the operating team include Bill Hall, assistant superintendent; Max Miller, preparation foreman; Wilson Travis, 1st shift pit foreman: Amos Teague, 2nd shift pit foreman; John Holler, 3rd shift pit foreman; Jewell Barnett, 2nd shift tipple foreman; and Aubrey Cates, 3rd shift tipple foreman. Owen Barber is chief clerk and George Daniels is warehouseman.

Preparing for Shovel Stripping

The company-designed horizontal drill and a Payne load-tamp machine make it possible to load and shoot sufficient overburden for round-the-clock stripping by a 33-yd Bucyrus-Erie 1050B shovel.

The horizontal auger is the product of ideas and know-how contributed by Vernon Curtis, master mechanic, and Fred Schroeder, superintendent, at Peabody's Midwest mine. Mounted on the frame of a Bucyrus-Erie 29T drill, the new drill employs an Austin AP9 head with AP2 bits to bore 9-in holes to a depth of 80 ft.

Drill features include a hydraulically powered storage rack that holds four 16-ft threaded auger sections. The lead auger is 20 ft long. From his control station in the cab the operator can rotate and pivot the storage rack so that an auger section will be in the proper position when the rack is moved down to the drill carriage. Auger sections are held in position in the rack by spring-loaded clamps.

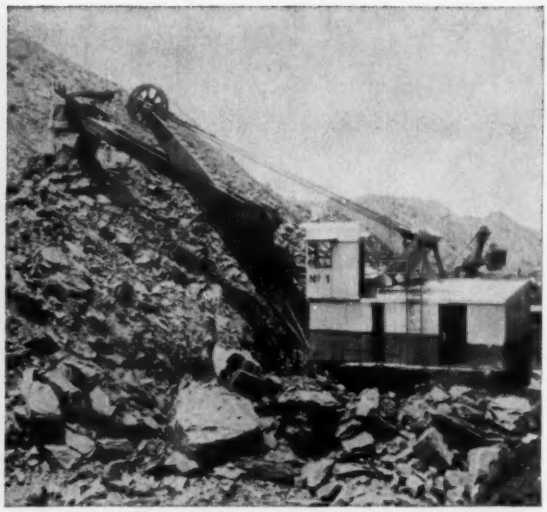
As soon as a new auger section is in position in the carriage, the operator engages a hydraulic gripping device that seizes the section. This device overcomes the holding action of the spring-loaded clamps and thus removes the section from the rack as it is raised to the storage position. The new auger section is thus aligned with the electric drive chuck and the auger section ahead of it.

The operator connects the new section to the chuck by maintaining pressure on the auger clamp and feeding the rotating drive until the new section is threaded into the chuck. To connect the section to the one in the hole, the operator releases the hydraulic clamp and engages a second clamp that immobilizes the auger section in the hole while the new section is threaded onto it.

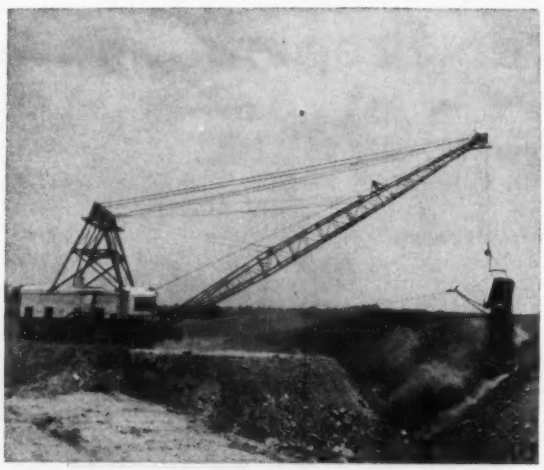
Auger stems are 8 in in diameter and scroll pitch is 5½ in. The electrically powered gearbox drive has two forward and one reverse speeds. The unit can drill holes angled upward or downward as much as 35 deg and horizontally anywhere between the top of the coal and 9 ft above it.

From a position on top of the No. 12 coal at Vogue, the machine drills holes horizontally 3 to 4 ft above

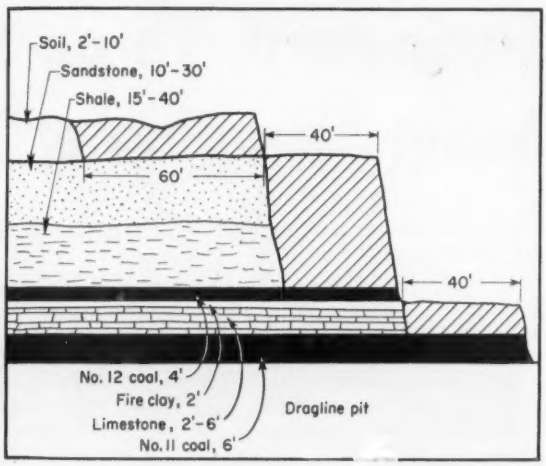
SPECIAL DRILL, built by company, employs four jackhammers on single arm to bore hard limestone between seams.



INTERVAL ROCK in shovel pit is stacked up along edge of spoil bank by 6-yd shovel with longer boom and stick.



DIESEL DRAGLINE, 14-yd bucket from 165-ft boom, removes 140 ft while handling overburden on three levels.

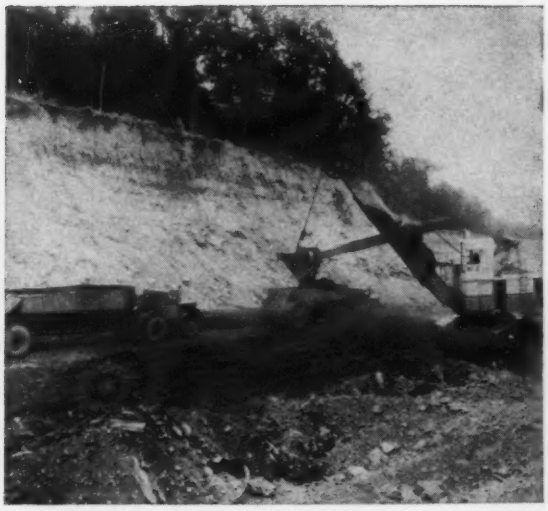


DRAGLINE STRIPPING includes cutting down top soil to provide bench for next cut, uncovering 40-ft strips of coal.

SHOVEL with 133-ft boom and 33-yd dipper on 69-ft stick makes two passes in removing 85- to 95-ft strip of overburden.

RIPPER with hydraulically operated pin for fast changing of tooth position breaks hard coal for easier loading.

ALTERED SHOVEL cab on roof of housing and lengthened boom and handle loads lower seam into trucks on upper seam.



UPPER SEAM at Vogue operation is loaded into semitrailers traveling on solid coal left for roadway next to highwall.

the coal to a depth of 80 ft. The company varies hole centers between 18 and 30 ft.

Employing a Payne load-tamp machine, the shooter follows the drill and charges holes with 50-lb cartridges of 7x40-in Olin 23G and approximately 5% Olin LX10A primer. To get this powder-primer ratio, four primers are distributed throughout the charge. The first primer is placed against the second cartridge of explosives and then one is placed for every four cartridges.

Detonating fuse extends into each hole and terminates at the second cartridge from the back of the hole. Since the primers can be detonated by the detonating fuse, only one cap is required to initiate a series of holes. To keep vibration to a minimum 17-MS connectors are used between holes.

Shovel Stripping

In exposing the No. 12 coal, the 1050B Bucyrus-Erie shovel takes two 45-ft passes through the broken overburden. After making the initial pass the pit is 85 to 95 ft wide, since one-half a cut was left for a truck roadway when the pit was opened. A Caterpillar D9 bulldozer with a hydraulic ripper and tooth positioner follows the shovel and breaks up the outer 45 to 50 ft of the uncovered coal. In less than 2 hr the bulldozer can rip enough coal for a full shift of loading.

A Marion 151M shovel with a 9-yd coal dipper then moves into the pit and loads the ripped coal. As soon as this strip of coal is removed the pit crew exchanges the coal dipper for a 6-yd rock dipper so that the shovel can be used for removing the interval rock. Management has trained the crews to make the dipper change in as little as 7 min.

As the first step in removing material separating the two seams, the converted coal shovel skims off the 2-ft layer of fireclay covering the hard limestone above the No. 11 coal. A company-designed rock-interval drill employing four Gardner-Denver jackhammers spaced 6-ft apart on one boom follows the 151M and sinks 1¾-in holes every 6 ft. This procedure produces holes at the corners of 6-ft squares.

An old 42T drill provided the frame for the interval drill. It now houses two Gardner-Denver 525-cfm compressors for operating the four drills and the operating controls.

Because the elevation of the nearby Pond River is the same as the No. 12 coal, considerable water seeps into the holes in the limestone. For this reason the company shoots the limestone at the end of each shift. Holes are charged with Olin Minegel No. 2. All holes are laced with detonating fuse and 17-MS connectors are used between rows.

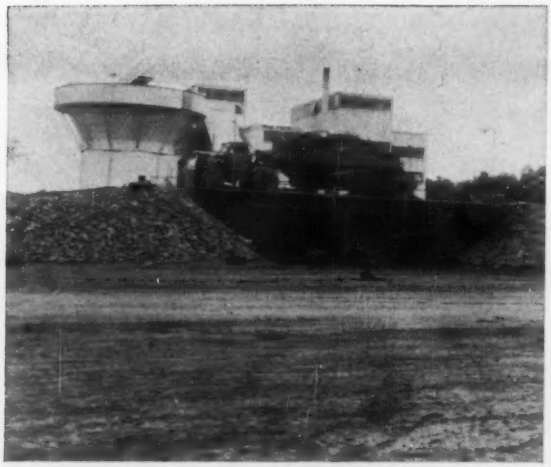
A second 151M with a 6-yd rock dipper, 35-ft handle and 48-ft boom piles the broken limestone against the lower part of the spoil bank. To enable the 151M shovels to work more effectively in the two-seam pit Peabody made several significant changes. These include lengthening the dipper handles and booms and elevating the operator's cab to the roof of the housing. In his elevated position the operator can see the dipper while coal is being dumped into trucks. He also is able to see the spoil area while removing the interval rock. Dumping height of the combination shovel is 38 ft.

Loading and Hauling

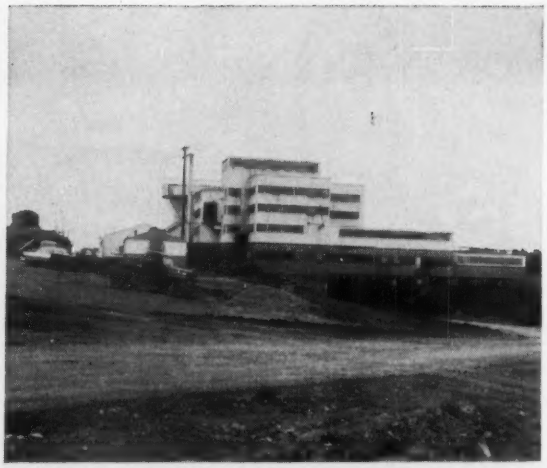
Vogue's haulage fleet includes nine Euclid 30- and 45-ton semitrailers. These trucks always travel on top of the No. 12 coal regardless of which seam is being loaded. It is when loading the No. 11 coal that the altered shovels prove their value. After leaving the pit, trucks travel on 60-ft-wide roads which are regularly patrolled with a motor grader and sprinkled during dry weather.

Preparing for Dragline Stripping

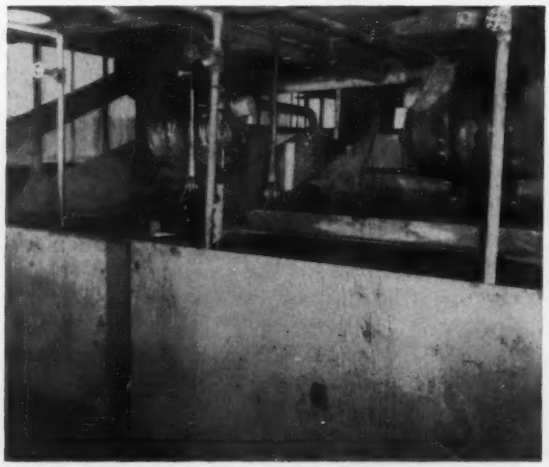
The second Vogue pit relies on a Bucyrus-Eire 50R vertical rotary drytype unit for drilling overburden. Equipped with a 10⅝-in Hughes OSCJ1 bit, this unit bores holes on 20-ft centers in rows 24 ft apart. Holes in alternate rows are staggered to produce a diamond pattern. Holes are charged with ammonium-nitrate-



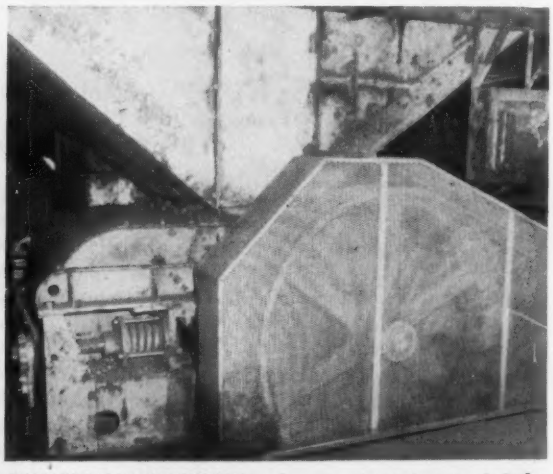
STORAGE BIN at preparation plant holds 500 tons. The bin feeds coal to a double-roll crusher for reduction to 7x0.



PREPARATION PLANT processes 11,000 tpd, including three-step jigging, clean-coal crushing, dewatering, oil treating.



DEWATERING VIBRATORS with stainless-steel screens remove 1mmx0 from ¼x0 feed, discharge larger size into mechanical dryers. Fines and water join centrifuge effluent for disposal.



CLEAN-COAL CRUSHER reduces various sizes to 1x0 for rescreening into 1x¼, ¼x28m and 28mx0 sizes for separate loading or for direct loading into railroad cars.

oil mixture, which is delivered to the mine packaged in 8-in burlap bags lined with polyethylene. Each bag holds 50 lb of the mixture.

The company maintains approximately 120 ft of buffer between the pit and drilling site. By maintaining the buffer the company is able to have greater flexibility in bank preparation, such as, drilling and shooting between two and six rows of holes without interfering with stripping operations.

In charging the shooter first drops a bag of the nitrate-oil mixture into a hole, then adds a 10-lb primer of Olin LX10A, to which is attached detonating fuse. When more than one primer is needed to bring the primer ratio to 5% of the charge, they are distributed so that no more than three bags of nitrate-oil are between each primer.

To minimize vibration and get the best possible relief in blasting, the company uses 9- and 17-MS connectors between holes. To further reduce vibration no more than 15 holes are set off at one time.

Records of rotary-drill-bit life show that eight bits drilled 101,496 ft, or an average of 12,687 ft per bit. After retipping, the bits drilled an average of 5,757 ft with no noticeable difference in performance.

Dragline Stripping

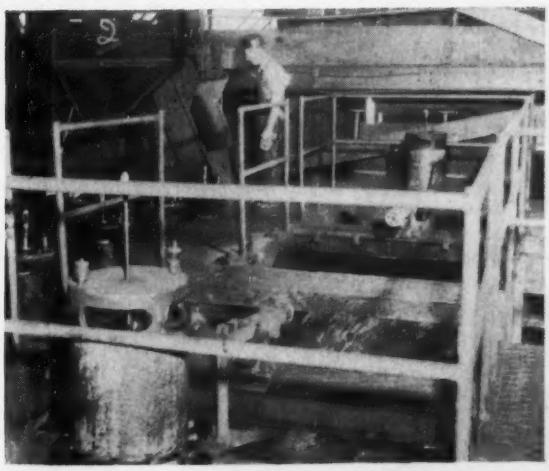
Swinging a 14-yd Esco bucket from a 165-ft boom, a Bucyrus-Erie 450W diesel-powered dragline works on the shot bank three shifts per day, seven days per week. This unit strips a total width of 140 ft on three levels.

Resting on a 60-ft bench made on the previous pass, the dragline reaches down into the pit and removes the interval rock between the two coal seams. It also removes a 40-ft strip on the No. 12 coal and makes a 60-ft working bench for the next cut.

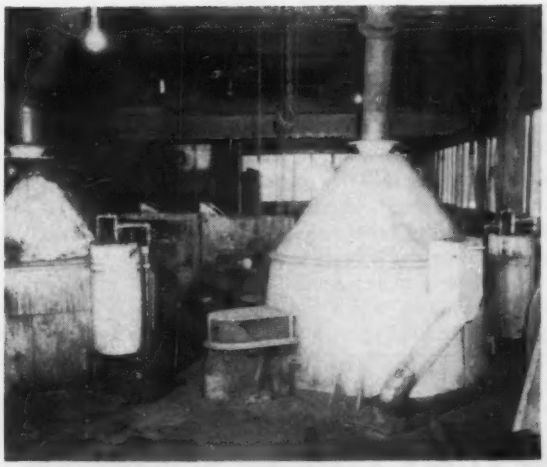
The rock interval in this pit also is drilled with a company-built unit with two Gardner-Denver jackhammers mounted on a horizontal arm. Charging and blasting methods are the same as in the shovel pit.

Loading and Hauling

A Bucyrus-Erie 120B shovel with



FIRST STEPS in coal preparation process include hand-picking on shaker screen and washing in 5-cell unit.



FINAL DEWATERING of ¼x1mm is assigned to a pair of centrifugal dryers. Effluent goes to sump, then to settling pond.

PIT PUMP on skid-mounted steel float has hand winch that enables workers to easily raise or lower suction line.

MEETING in mine office are R. T. Taylor (left), electrical engineer; Wilson Travis, pit foreman; D. C. Hall Jr., superintendent; William Hall, assistant; Owen Barber, chief clerk; Max Miller, tipple foreman; and George Daniels, warehouseman.

a 7-yd coal dipper, working on the fireclay covering the limestone, loads coal into trucks traveling on the No. 11 level. Since each seam is loaded and prepared separately, the company takes special care to remove any No. 12 coal that spills onto the No. 11. The spillage is piled on top of the No. 11 and loaded separately.

Because of variation in pit width, loading methods for the No. 11 coal vary. For instance, when the overburden is 30 to 50 ft thick, the pit is wide enough so that the trucks can travel on the No. 12 coal while carrying No. 11 coal. But if the pit is narrow trucks are spotted on the fireclay under the No. 12 coal while No. 11 coal is loaded. Then the No. 12 is loaded into trucks traveling on top of a strip of coal next to the highwall.

Preparing the Coal

Trucks discharge into a 500-ton bin from which a reciprocating feeder moves the coal to a McNally Pittsburgh 36x60 double-roll crusher for reduction to 7x0. Dropping into a drag conveyor, the crushed product then travels to a raw-coal shaker screen for hand-picking. The hand-picked material splits into two streams and flows to a pair of McNally Norton 5-cell wash boxes that make a separation into clean coal, middlings and refuse. A portion of the 3-in raw material is diverted to a secondary McNally Norton washer to provide a bed in the washing unit.

Middlings from the two primary washers combine and flow to an American Ring pulverizer for reduction to 1½x0 and subsequent delivery to a McNally Norton 5-cell wash box for secondary cleaning. Middlings from this wash box are further processed in a McNally Norton 3-cell washer.

Clean coal from the three washing circuits is sluiced to an 8-ft dewatering and classifying shaker screen for separation into 7x4, 4x2, 2x1½, 1½x¾ and ¾x0 fractions. The ¾x0 and water flow to two Allis-Chalmers Low Head vibrators for further dewatering and separation into ¾x¼ and ¼x0 sizes.

After dropping onto a drag con-

veyor, the ¾x¾ is carried either to a two-compartment mixing conveyor or a companion conveyor for loading into cars on any one of the five tracks. The ¾x0 and water pass to a settling tank from which a drag conveyor removes the coal and discharges it into a dewatering elevator. This unit discharges the partially dewatered coal into a sluice leading to a pair of Allis-Chalmers 5x14-ft Low Head dewatering vibrators equipped with Bixby-Zimmer 1-mm stainless steel screen, on which it is further dewatered and split into ¾x1mm and 1mmx0 fractions. Feed to the fine-coal vibrators normally is split and fed to the two units but it can all be sent to one screen in an emergency.

The dewatered ¾x1mm feeds to a pair of CMI centrifugal dryers for mechanical dewatering. A flight conveyor receives the dried ¾x1mm and discharges it into the two-compartment mixing conveyor or the companion conveyor for loading on one of the five tracks.

The 1mmx0 and effluent from the CMI dryers flows to a sump from which an Allis-Chalmers 6x8 slurry pump picks it up and discharges it into an 8-in pipeline leading to settling pond 1 mi away.

The 1½x¾ product from the classifying screen can be loaded separately, mixed with other sizes or recirculated to a McNally Gearmatic 36x60 double-roll crusher for reduction to 1x0. This product may be loaded separately or rescreened into 1x1¼, ¾x28M and 28Mx0 sizes, which then are loaded separately.

The 2x1½ is normally recirculated to the Gearmatic stoker crusher, broken to 1x0 and rescreened. The 7x4 and 4x2 products may be loaded directly, crushed and loaded, or rescreened before loading.

Crushing and Rescreening

A gravity-discharge elevator receives the product from the Gearmatic crusher and carries it to the top of the plant. There it passes over two Allis-Chalmers Ripl-Flo vibrators making a separation into plus 1-in, 1x¾ and ¾x0 sizes. After passing through a McNally Pittsburgh 24x48 Gearmatic stoker crusher, the broken plus 1-in passes to a secondary Ripl-Flo vibrator that splits it into 1x¾ and ¾x0 products.

The 7x4, 4x2 and 2x1½ sizes travel to the crusher in the single compartment on the lower strand of the mixing conveyor and the rescreened products return on the upper to discharge on loading booms.

Stainless-steel-lined chutes carry refuse to a 50-ton hopper in the plant. Two Euclid 15-ton trucks then carry the refuse either to a waste area or back into the pit where it is buried under the spoil.

Management notes that by lining the refuse chutes with stainless steel, material will flow by gravity on a dip of 5 in 12 as compared to 7 in 12 on nonstainless steel.

Overflow from the ¾x0 settling tank is picked up by four McNally 10x10 recirculating pumps that discharge through separate lines into a 120,000-gal settling cone. Clarified water from the cone is recirculated to the wash boxes.

Settled waste drains to a slurry sump where it joins effluent from the CMI dryers for delivery to the settling pond. Plant management notes that the settling tank plays an important role in preventing buildup of fine clay in the recirculating water.

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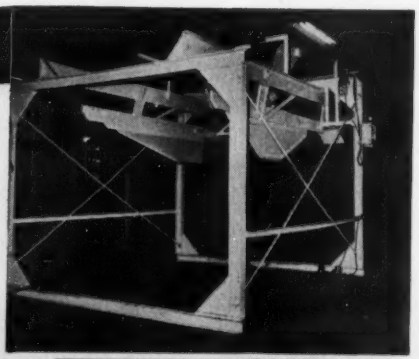

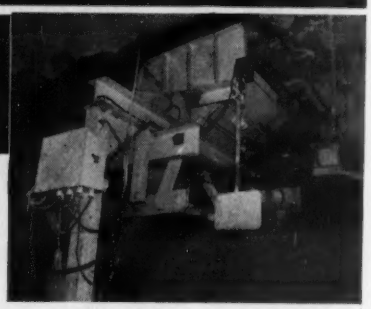

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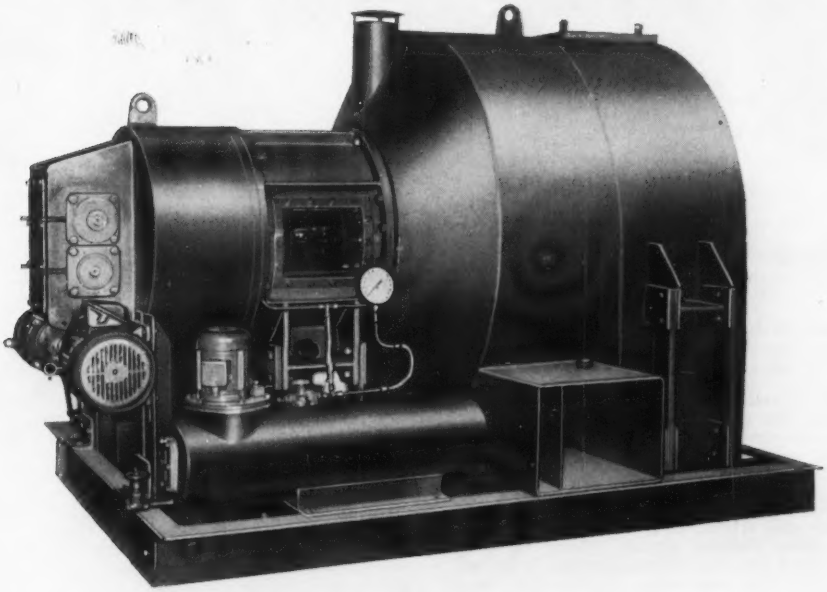

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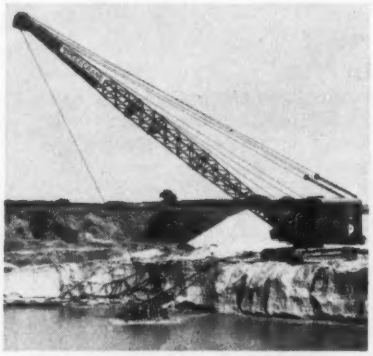
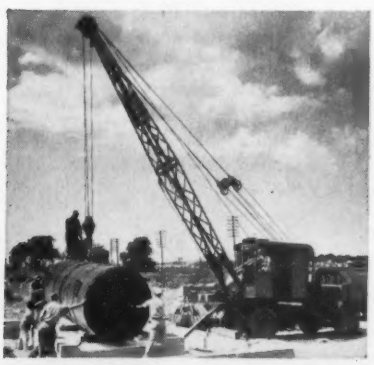


Tuffy Balanced Dragline Rope

Tuffy Balanced Scraper Rope

Tuffy Balanced Dozer Rope

Helicopters, long noted for their disaster missions, are becoming "work horses" in the air. Equipped with wire rope and slings they pick up and set materials and machinery down in inaccessible places and carry hurry up loads to otherwise easy to get to places. Photo courtesy Bell Helicopter Corporation, Ft. Worth, Texas.



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Tuffy Wire Rope Tips

Money-Saving Ideas on the Use and Care of Wire Rope

How to Check Groove Diameter

Not Quite

Just Right

Groove diameter of a sheave or drum must never be less than the actual calipered diameter of the new rope. When a new rope is installed on old equipment, use a reliable groove gauge to make sure the tread or bearing surface of all sheaves is of sufficient size to avoid pinching the rope.

Recommended Sizes

Diameter of Rope	Min. Dia.	Max. Dia.
¼-⅞	+ 1/64"	+ 3/32"
15/16-1¾	+ 3/32"	+ 1/16"
1⅞-1⅛	+ 3/64"	+ 3/32"
1¼-1½	+ 1/16"	+ 1/8"
1⅝-2¼	+ 3/32"	+ 1/16"
2⅜ and larger	+ 1/8"	+ ¼"

New ropes are usually oversize. It is advisable to have groove diameters of sheaves or drums as large as the actual calipered diameter of the new rope, or slightly larger.

Use the Right Fittings

Right fittings add life expectancy to wire rope. Fittings which derive holding power from crimping action are harmful. Shown here is a clamp that has no "wrong side"—can be put on either way. It snugly saddles the rope, grips larger surfaces in such a way that loads are carried almost entirely by friction instead of crimping action. Combined in its two parts is a thimble. The parts are interlocked to prevent collapse of the thimble, and eliminate all shear on the bolts.

Would you like a copy of a booklet in which more than a score of Tuffy Tips like those above are reproduced. If so, write Union Wire Rope Corporation, 2130 Manchester Ave., Kansas City 26, Missouri.

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4-C

You're busy and reading takes time although you know it's a must. Here's . . .

How to Cut Your Reading Time

WHAT'S YOUR READING SPEED?

This article contains 2,700 words. At the *average* businessman's reading speed of 250 words per minute it will take 11 min to read this article. Check yourself against this average as you read this article for the first time, then read it once again, keeping in mind some of the principles outlined. You'll be surprised by the results, the kind you can readily apply to your day-to-day reading.

HOW MANY PEOPLE these days don't know how to read? Very few, you'll say. Yet many businessmen are now using only 20% of their reading capacities. They are reading less than 250 words a minute—the average for businessmen generally. This is because they read word by word, at a rate not much faster than they can talk. Trained readers can attain speeds of 1000 words per minute, and more.

Like swimming, reading is based on habits. The swimmer, when he is not practicing a particular stroke, is unconscious of his movements. Most people formed the habit of reading in grammar school, and have made little effort to perfect it to meet the demands of adult life. Like the swimmer, the reader needs to perfect his skill consciously if he is to survive in his personal sea of business literature, correspondence, newspapers, business publications, etc. He must trade his old bad habits for new good ones.

In the following pages we will give you the fundamental techniques and a self-improvement program that can help you to greatly increase your reading speed with improved comprehension. The rest is up to you!

SPEED

Cut Your Reading Time in Half

Skillful reading, like skillful swimming, gives you a head start. It cuts down backlogs of correspondence; it frees you to think and act – or frees time for other duties and pleasures. When you read faster, comprehend and concentrate better, you not only save time, but you also increase the value of your reading. You become a more alert, more responsive reader. You develop your ability to draw more intelligent conclusions from what you read.

Everyone in business and industry can benefit from an easing of his heavy load. You are probably already giving all the time you can to business reading, and find that the load increases almost every day. Better reading habits – gained through simple practice methods – can *cut your reading time in half.*

Reading habits are firmly established in the early grades of school. Therefore, it is going to take a certain amount of conscious effort to replace these habits with new ones. It might be compared to driving a hydromatic automobile after years of driving the standard shift. You would instinctively try to shift and it would take some practice before you could operate the car smoothly by using the new method.

Phrase Circling

Poor reading results mainly from the tendency of the eye to stop on every word. Your eyes do not simply sweep across the line when you read, but progress in a series of stops and moves, seeing the words only when they stop or fixate. Your reading speed depends largely on the deviations of fixations you make on each line of print.

The following sentence illustrates the eye movements of the untrained reader (each number represents one fixation, or pause of the eye):

1	2	3	4	5	6	7	8	9	10	11	12	13
If	you	read	word	by	word,	you	spend	needless		time	and	energy.

The eye movements of the untrained reader are haphazard, and the slower he reads, the less his mind is held on the subject.

Learning to take bigger visual "bites" of the printed page – *reading by phrases* – is the first and most important step toward better reading.

The skilled reader fixates briefly once on every phrase and absorbs it as a unit.

For his eye movements are rhythmic and efficient. For example, he makes only four fixations compared to the thirteen made by the untrained reader.

1		2		3		4	
If	you read	word-by-word,		you	spend needless	time	and energy.

Phrase-reading not only increases speed, but it also improves comprehension and concentration by "keeping the mind busy." You can think much faster than you can read, since your mind naturally moves faster than your eye. If you read slowly, your mind is free to wander. But by reading faster, in phrases, your eyes provide your mind with more absorbing material. You do not have to stop after three or four fixations to assimilate an idea as you do in reading word-by-word. By reading in thought units, you are reading the same way you think, in concepts.

To build an awareness of phrases, try circling them on the printed page. For example, take a pencil and circle each of the meaningful thought units on the exercise paragraph that follows. Read it a second time, taking in each circled phrase. Ten minutes of daily practice will soon have you automatically seeing phrase groups instead of words.

EXERCISE

• **On the Job** — The 10-years-after men aren't job-jumpers. Seventy percent have had either one or two employers, including their present one, since graduation. Only 4% have worked at five or more different jobs. Thirteen percent are self-employed, and many of the others — especially of the 40% working for firms with fewer than 500 employees — work in family concerns.

Middle management men work hard at their jobs. They average 50 hours a week; 15% of them put in 60 hours. Much of their "nonworking" time is taken up with business-related activity. Their magazine reading, for instance, is mostly trade or professional journals. In general, they get their deepest satisfaction from their families.

(FROM *Business Week*)

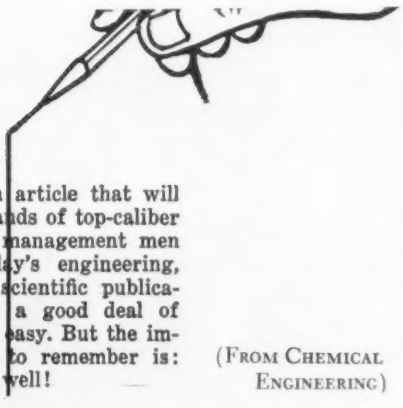
Space Reading

Space-reading—looking at the space just above the line of print, instead of directly at it—is the next step in developing rhythmic eye movements. Even after becoming aware of phrases, you may find it hard to read by phrases. This is because the white spaces between words naturally break the sentence into separate words. Your eye will still want to jump from word to word. By focusing on the space above the printed line, you will find your eye fixations will become smoother, and the phrases will hold together much better.

Once mastered, it will increase your reading speed and lessen the strain on your eyes.

Columnar Reading

You can also improve phrase-consciousness by letting your eyes move down a column of type with only one fixation per line. At first it will help you to draw a pencil line down the center of the column, and to follow this with your eyes. Try to see the first and last words of each line of type while looking directly at the center. Sample:



To write an article that will interest thousands of top-caliber technical and management men who read today's engineering, business and scientific publications requires a good deal of effort. It isn't easy. But the important thing to remember is: You can write well!

(FROM CHEMICAL ENGINEERING)

To start, you may find it easier to try the second and next-to-last words of each line of type. Later you may practice this technique on the way to work or during any breaks in the work routine. You will find it helps greatly to increase your eye span.

Variable-Speed Reading

This technique will intrigue you. As we're sure you know, you do not read all material at the same speed. You can handle light reading at high speed. Technical material slows down any man.

Variable-speed reading makes it possible to get a broad picture fast . . . to go right through the bold-face type and get the whole train of thought. If you want only the highlights you don't have to slow your pace.

However, you can shift gears as you read . . . if you do want the details. You can go rapidly through the article—with assurance that you will not miss any main point—until you come to a signal about a main point on which you want detail. You can then slow your pace to absorb the detail. Try this:

EXERCISE

Refinery Sleuth Traces Arsonists

A gas chromatograph—commonly used in refineries to detect different gases in a mixture—now can help identify materials used by arsonists to start fires.

The instrument works on the principle that, if a mixture of gases is allowed to flow through a specially prepared column, the different gases will travel at different speeds and can thus be separated.

W. J. Cadman, chief criminalist for Orange County, Calif., and Theron Johns, research chemist for Beckman Instruments, Inc., designers of the chromatograph, say this instrument with supersensitive probing powers figures in every case of suspected arson in the country.

In 90% of arson cases, the fire is ignited by gasoline. The gas chromatograph is able to identify the gasoline by brand and even by grade.

Cadman and Johns give an example of how the instrument is used:

A factory was damaged by fire, and police suspected arson. An extract of the ashes showed gasoline traces where no gasoline should be.

A can partially filled with gasoline was found near the fire's starting point. The chromatograph matched the contents of the can, as to brand and grade, with the mixture that started the fire.

An attendant at a nearby service station indentified the container. He also identified the customer who had borrowed it. The scientific detection helped obtain a conviction.

The instrument is said to provide a major breakthrough in arson detection.

(FROM *Petroleum Week*)

(*Continued on next page*)

Indenting

Also helpful is indenting—or not allowing your eyes to read either end of a printed line. When moving down from one line to the next, break away about ⅛ in in on the next line. Normally your eye automatically pulls to the white margin on either side and this slows down your reading speed considerably.

Self Pacing

Get in the habit of constantly improving your reading rate by pressing against the very limits of your current capacity for a few minutes every day. Time yourself every now and then to see how you are progressing.

COMPREHENSION

BENEFITS OF PRE-READING

Before pre-reading each article, you may think that this process wastes time rather than conserves it. Before long, however, pre-reading (with a little practice) becomes automatic, takes only a minute or two, and you will find that you will:

Save time. Not every article is of equal importance to you. A pre-reading will tell you whether you will profit by a thorough reading of the article at hand. It will tell you if the article is on a subject that will interest you. (Titles and brief descriptions can sometimes be misleading.) It will tell you if the discussion is too elementary and simply repeats what you already know. Or it will tell you it is too advanced, if you must get a better background before you tackle the article or book at hand. If a pre-reading indicates that the article deserves a *thorough reading* then you have also saved time by a preliminary survey. Your advanced sampling of the author's style, your foreknowledge of the major points to be covered and the conclusions to be drawn, all help you to get through the article more quickly.

How to Pre-Read

To pre-read an article, read the overview or summary of the main points. If the article appears useful, read the first two or three paragraphs, which are most always sure to introduce the subject in a general way. Then continue reading only the first sentences of each paragraph. Be sure to note subheadings, diagrams, charts, and pictures as you go along. The author will generally summarize his arguments in the last two or three paragraphs; read them thoroughly. If, after pre-reading, you feel a thorough reading is justified, you are ready to read intelligently and critically, since you already have an idea of what the author is talking about.

Summarizing and Critical Reading

Merely understanding what you read is not sufficient; you must evaluate it as well.

Summarizing is an invaluable technique to help comprehension and retention. To collect unrelated facts of varying importance is of no value to you. Therefore, summarizing will help you to organize these facts in order of importance. As you acquire the skill you will be able to summarize mentally, but to start it will be better to write down your summary.

As you read an article, clearly distinguish between main ideas and details. The topic sentence will usually give you the main point of the paragraph and the details will follow in the middle and latter part of the article. Jot down the main idea or topic sentence as you read and place the relevant points in order beneath it. This is a simple 1, 2, 3 — a, b, c pattern. Upon finishing, you will have an introduction statement, the main points that are to be retained, and a summary statement. This will provide you with a framework into which more detailed facts can be fitted and thus easily retained.

Environment

In all your reading, make sure you have a good environment, free from poor lighting and undue distractions. For example, always read in a well-lit room with at least two lights of equal intensity to prevent glare. And remember that excessive comfort will hinder, rather than increase your ability to concentrate.

It is vital to your career that you read with the same professional authority you exercise in all other phases of your job. Not only because it saves time for you. It also pays a bonus in new productive time. How? Because a man's mind moves far faster than he can read. Thus, as your eye races to catch up with your brain suddenly you have more time to think. And you think more lucidly. You concentrate easier. Plan more decisively. Move with new confidence. Inspire and impress others.

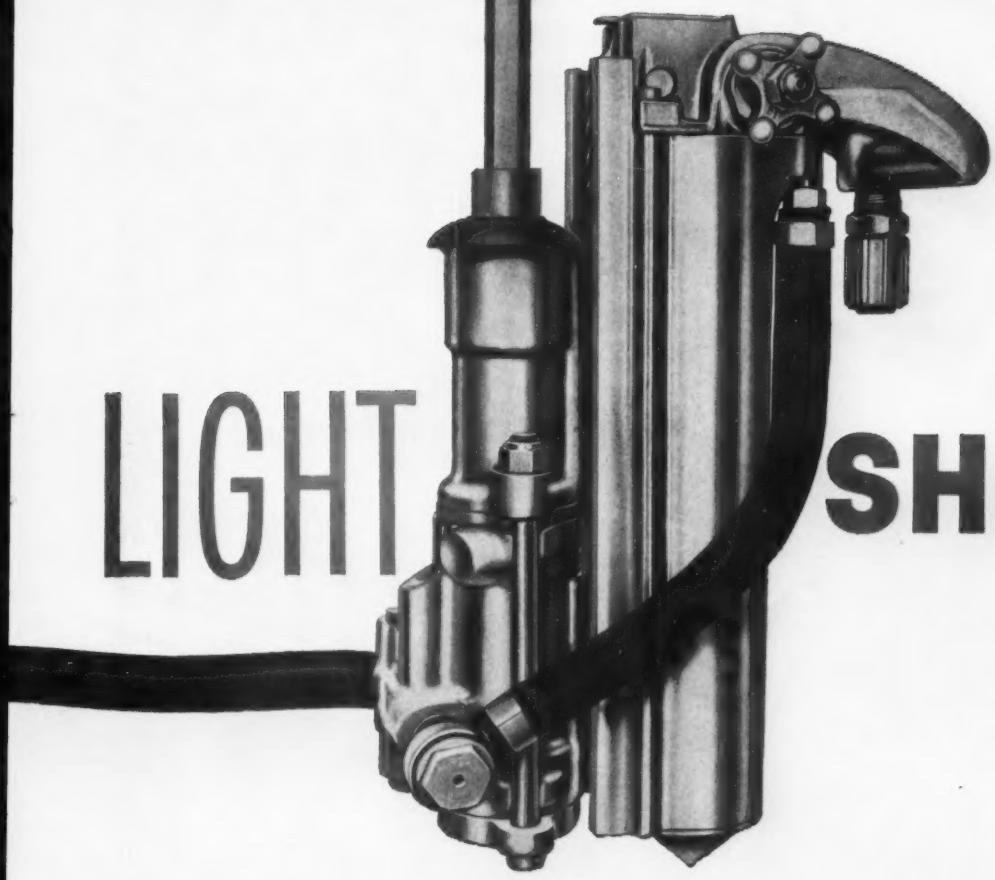
Thinking and reading can spell the difference between "just doing the job" and real success. Your McGraw-Hill business publication will keep you up to date on developments in your own field and on the national scene—if you know how to read effectively in the time you have.

That is why McGraw-Hill publications and the Reading Laboratory, Inc. have cooperated to bring you this material to help you attain greater reading speeds with better comprehension.

The preceding article was reprinted from a booklet entitled "How to Cut Your Reading Time," published by the McGraw-Hill Publishing Co. and based on tested procedures developed by the Reading Laboratory, Inc. Free copies of the booklet may be obtained by writing the McGraw-Hill Publishing Co., Inc., Room 601, 330 W. 42d St., New York 36, N. Y.

A more-complete discussion of all aspects of reading improvement is available in the book "Cut Your Reading Time in Half," prepared by the Reading Laboratory and available at $1.25 from its publisher, Developmental Research Institute, Inc., Dept. "H," 500 Fifth Ave., New York 36, N. Y.

"DUSTLESS" S 20 STOPER is available with 28-, 46-, and 64-in. feeds... weights; 65, 78, and 88 lbs. It can be used for fast, dustless roof-bolting wherever a man can crawl!



LIGHT SHORT

LE ROI S 20 STOPER DUSTLESS

• drills in 26-in. coal • delivers lightweight power • cuttings never pass through stoper

The thousands used in coal mines prove that the Le Roi S 20 Dust-Collecting Stoper is the shortest, lightest, and the only practical stoper for 26-in. seams!

Le Roi's Vac-Nu-Matic® dust-collection is fast, positive — reduces wear on men and machines. Perfect dust removal minimizes rotational drag, eliminates stuck steel, and speeds drilling even in soft, wet formations. The S 20 removes dust through the chuck housing — not through the stoper — drills deeper with one steel change than conventional stopers can with two! Its design permits chuck changes without dismantling the machine.

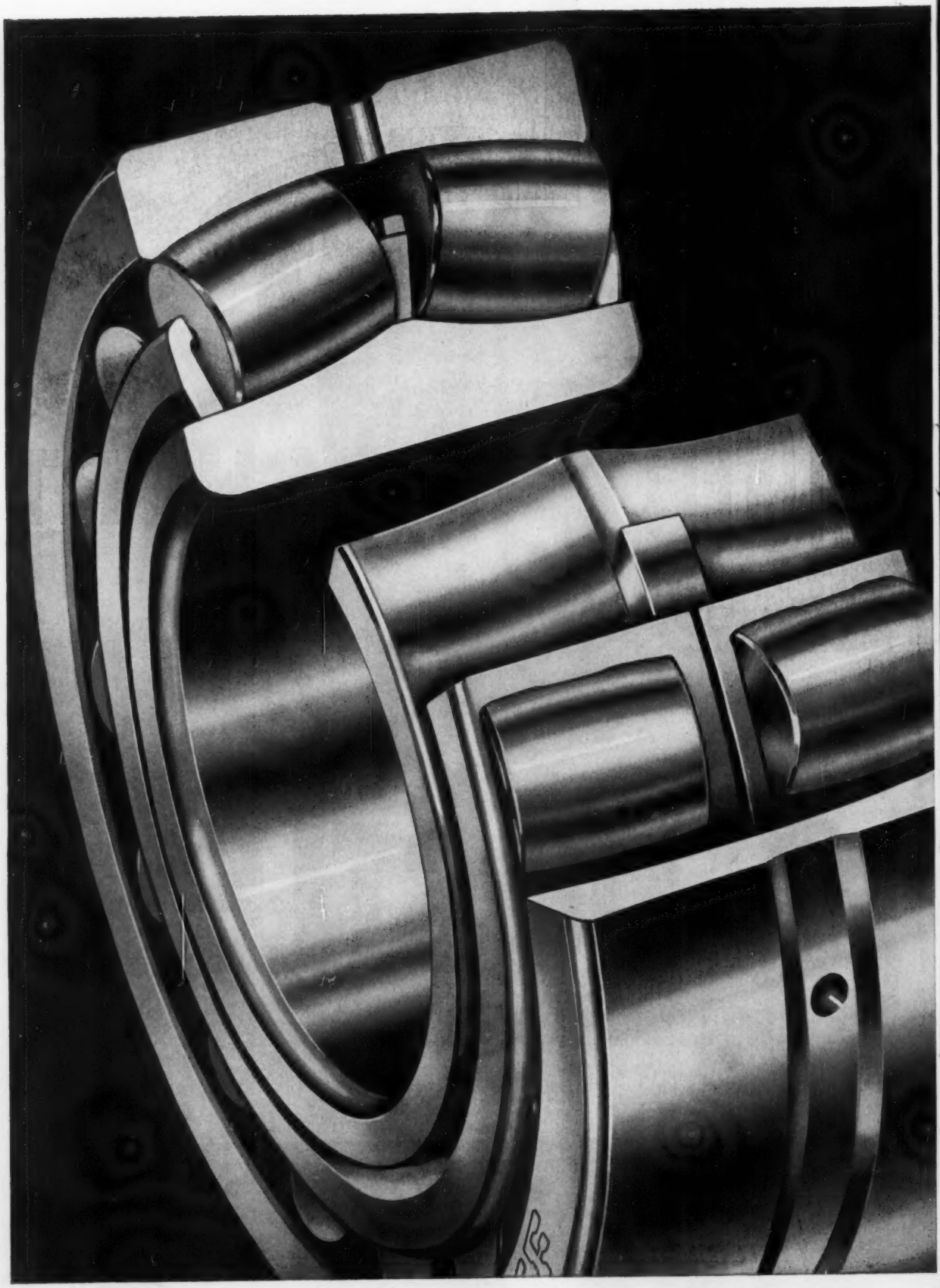
Call your Le Roi distributor for more information — and a demonstration. Or write to Le Roi Division, Westinghouse Air Brake Co., Milwaukee 1, Wisconsin.

LE ROI NEWMATIC® AIR TOOLS

PORTABLE AND TRACTAIR® AIR COMPRESSORS • STATIONARY AIR COMPRESSORS • AIR TOOLS

Distributed in the Coal Fields by: Acme Machinery Company, Huntington, West Virginia, and Equipment Service Company, Inc., Birmingham, Alabama.

AT-903



Now SKF has improved the spherical roller bearing it invented!

This new spherical roller bearing offers even higher capacity than SKF's original, self-aligning bearing – and meets the needs of today's faster, more productive machinery. In some cases, the increase in capacity is as much as 54% – corresponding to more than 4 times longer service life!

Here's how these improvements have been obtained:

1. Eliminating undercuts and integral flanges – helps provide space for larger rollers and longer effective contact between rollers and races.

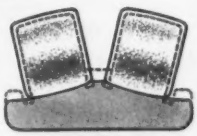


Fig. 1

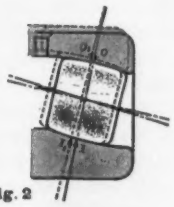


Fig. 2

2. Using symmetrical rollers, unrestricted by flanges – ensures uniform load distribution over the roller length at all times, even under heavy thrust load.

3. Using an axially floating guide ring – provides effective roller guiding, and minimizes friction at roller ends.

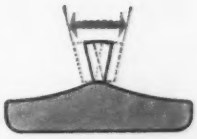


Fig. 3

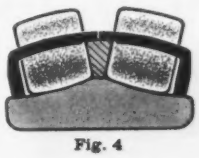


Fig. 4

4. Using a strong "window-type" cage for each row of rollers—helps ensure dependable operation over a full range of loads and speeds.

5. Placing a lubricant duct in the center of the outer ring—helps channel lubricants directly to the rollers and push contaminants away.

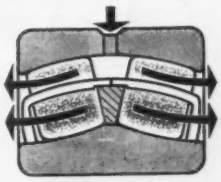


Fig. 5

For full details on this new high-capacity spherical roller bearing call the nearest SKF sales office or authorized SKF distributor listed in the yellow pages of the telephone book.

5931

Spherical, Cylindrical, Ball, and "Tyson" Tapered Roller Bearings

EVERY TYPE—EVERY USE

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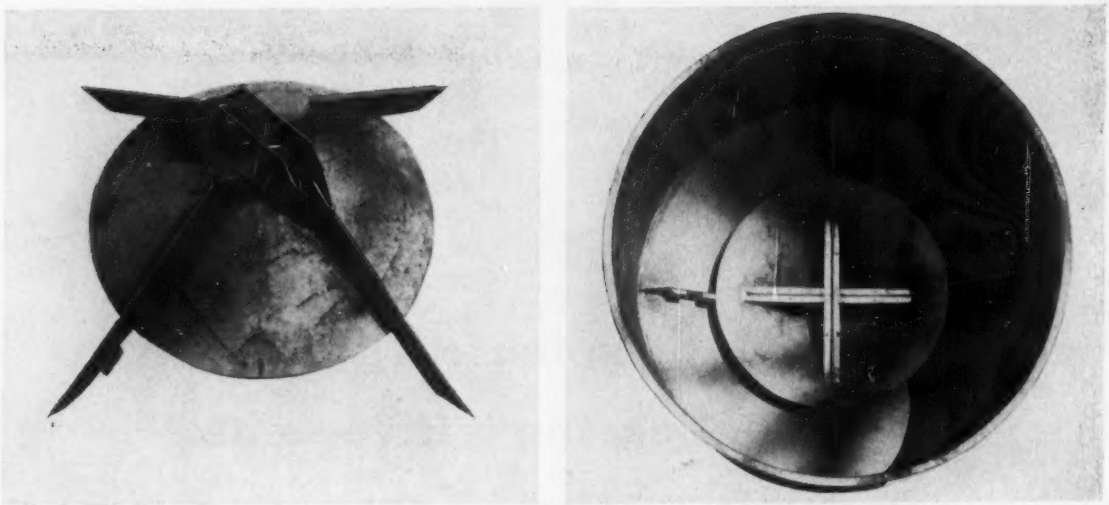


GRAVITY BLENDER in model form. Ribs in view at left position blender at proper height above bin bottom. Since the model was designed to permit splitting the discharge into several fractions for analysis, it includes some details that would not be found in a commercial unit. Blender is shown in place in a hopper at right. The cross members are not required for its operation but were put in to hold a lowering chute.

Minimizing Size Segregration In Reclaiming Stored Coal

How simple gravity blender added to conventional bin or hopper provides a draw-off with a size consist close to the original

James B. Matthews
Templeton-Matthews Corp., Terre Haute, Ind.

SIZE SEGREGATION has been a problem when transporting, storing or loading coal since the beginning of modern preparation.

When coal or other free-flowing granular material is placed in storage or loaded it will form a conical pile with sloping sides. The degree of slope will vary with the natural angle or repose of the material. As more and more material is fed onto the pile it spreads uniformly, as to mass, over the entire pile surface.

When it comes to the individual particles of varying size from fine to coarse the story is quite different. These pieces come to rest in or on the pile in direct relation to their size. The smallest pieces come to rest first while the larger and larger pieces move farther and farther away from the point of feed. This results in size classification, with the finest particles in the center of the pile.

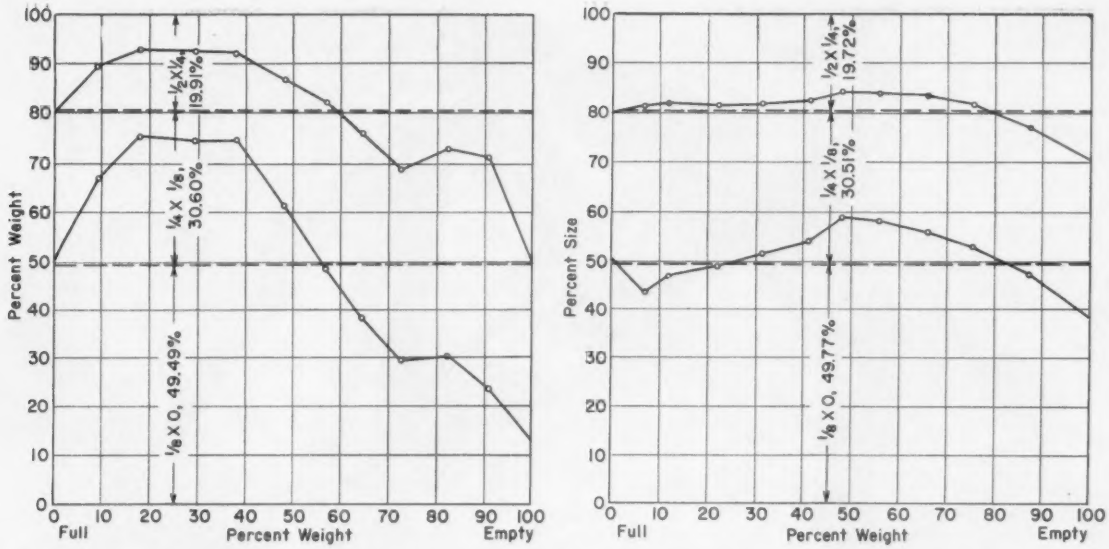
The usual method of reclaiming from storage is to feed out through a central opening or openings to a feeder or conveyor. This results in a condition known as "rat-holing" or "coring," reflecting the action of the material as it is withdrawn from storage. The initial flow of material is largely from the center, with very little from the outer edges. The center core, which drops out first, contains primarily fine material. This is not because of the way the material is recovered but rather reflects the way it was placed in the pile, bin or hopper. Thus when material is reclaimed the initial draw will be predominately fine and the final draw predominately coarse.

Many devices have been developed in an effort to eliminate segregation in piling or feeding to a storage hopper. Some have been patented and are in use today.

A second method of attacking the problem is blending the material back to its original size consist. This can be done quite accurately provided sufficient equipment is used. Cost, however, is prohibitive in most instances.

The ideal unit would be a simple blending device with no moving parts requiring only one discharge opening. How one such device (patent applied for) tested out is the subject of this article. The goal with this gravity blender is reclamation by gravity flow of coal or other granular materials of varying size consist through a single opening with simultaneous restoration of the material to approximately its normal or original size consist.

Basically this gravity blender consists of an auxiliary bottom added to the conventional bin or hopper bottom. A model arrangement is shown in the accompanying photographs. The slope of the conical auxiliary bottom is less than the slope of the main hopper bottom, thus providing a self-relieving action. Ribs hold the auxiliary bottom the desired distance away from the main hopper bottom. The cross beams in the model support a lowering ladder, though it is not necessary to the operation of the



BEFORE AND AFTER with the gravity blender. Curves at left (cylindrical bin storage with surcharge—standard conical hopper) show size segregation encountered without blender. Curves at right show how blender restores size consist to nearly original proportions.

device. In actual use it is contemplated that an inverted core would be used above the discharge opening in normal bin applicators. The unit can be installed in existing bins and hoppers without reducing capacity.

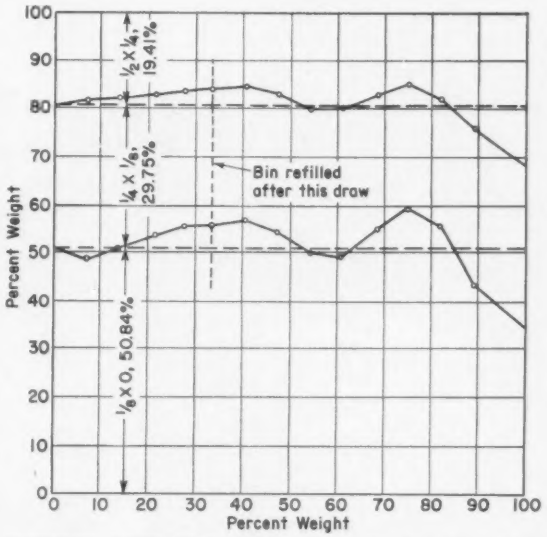
As a result of the design, the blender retards the removal of the fine core material and draws from various zones over the entire cross-section of the storage area. Coal drops out simultaneously from the center opening of the device and from the region formed between the blender bottom and the hopper bottom. In this manner the pile drops uniformly over the area of action rather than a core of fine material dropping out of the center immediately over the discharge opening. This uniform drop results in a size consist that is maintained within reasonable limits.

Model tests indicate that the blending action actually results in a size consist for the drawn-off product corresponding fairly closely with that of the original feed. The tests were conducted to simulate bin and open storage using conical and square hoppers. Various methods of loading were employed including center, off-center, and corner loading, with and without deposition through a lowering ladder or chute, plus partial discharge and refilling to cover all the usual variations.

To gage the effectiveness of the blender the test setup was arranged so that the drawn-off coal split was into three streams to permit a check of results by zones. A gate mechanism permitted discharging the coal in draws of various sizes to provide an opportunity to check on the results at various stages in emptying the pile or hopper.

The coal used in the tests was primarily ½x0, representing 6x0 at the model scale of 1 in equals 1 ft. Consist was 20% ½x¼; 30%, ¼x⅛; and 50% ⅛x0, subject to slight variations as a result of slight screening variations, etc.

Fourteen tests were made with coal, all showing approximately the same results. Two of the accompanying charts show results with conical-bin storage with surcharge. Ten draws were made to empty the bin. With the blender the maximum variation in ⅛x0 percentage from the original figure was 9.02%. Without the blender the maximum variation was 25.67%, indicated graphically by the deviation of the curve from the dotted horizontal line representing the original size consist.



BLENDER OPERATION with refilling after five draws. Size consist stays close to original until final draws to empty bin.

Normally, of course, bins are not filled and then completely emptied before refilling. One test therefore involved drawing off half the original load, refilling and then completely emptying. With the blender, as shown in the accompanying chart, variation from original size consist was relatively small, except for the cleanout draw. In practice, if the maximum in consistency was desired, the bin could be equipped with an indicator to interrupt withdrawal before complete cleanout occurred.

PEABODY COAL COMPANY
SUNNYHILL MINE

The tail that wags the dog—

USS Tiger Brand Amerclad Cable

This 65-cubic-yard shovel scoops overburden at the rate of 1,500,000 cubic yards a month at the Sunnyhill Mine of the Peabody Coal Company. It operates on a 6,900-volt electrical system and has a 9,000 horsepower capacity including all motors.

Power is supplied through a USS Tiger Brand Amerclad Cable. The cable takes a lot of abuse in its long run under a roadway, through a creek and over jagged rocks. It is standard 8KV three-conductor Type SH-D cable. The insulation is tough, flexible Amerzone rubber. Each conductor is shielded for safe handling with a close serving of tinned copper wires securely bound in place and supplemented by heavy copper ground conductors. Such a shield provides the flexibility lacking in a full copper braid and avoids the break-up of the wires due to chafing at cross over points.

Ground wires, Neoprene fillers and a heavy, tough, reinforced jacket of oil resistant Amerprene complete the cable. And by providing positive clearing of the cable in case of a "short," this construction is tops in safety.

American Steel & Wire also makes Armorlokt cables, bore hole cables and a complete line of power distribution cables noted for their high quality. For complete information, write American Steel & Wire, Dept. 0374, 614 Superior Ave., N.W., Cleveland 13, Ohio, or contact our nearest distributor.

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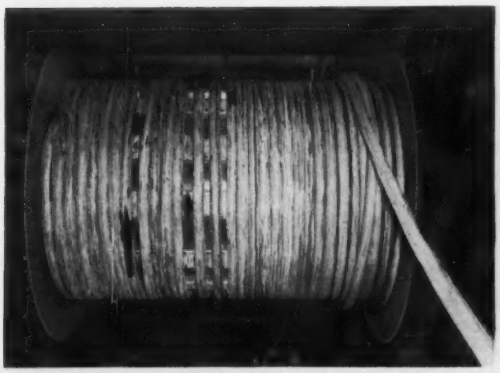

Greater flexibility of Amerclad permits constant reeling and unreeling.

Constant exposure to mud, acid mine water, abrasion and weather doesn't harm Amerclad Cable.

◀ **The tail that wags the dog.** Tiger Brand Amerclad Cable (foreground) is the finest you can get for big shovel power supply.

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Fire-Resistant Fluid . . . Harwick Mine Experience

Two years in a shuttle car and 1 yr in other units in a continuous-miner development unit show satisfactory performance and comparable maintenance. Cost of water-in-oil fluid is somewhat more than 1¢ per ton higher than oil

J. A. Younkins
Assistant General Superintendent, Coal Dept.

M. E. Fowler
Safety Engineer, Harwick mine, Duquesne Light Co.

PRINCIPALLY through the efforts of S. P. Polack, mining health and safety engineer, U. S. Bureau of Mines, we became interested in trying out fire-resistant hydraulic fluids because of the potential safety factor with respect to fire hazard underground, which the use of such fluids appears to offer, compared to the use of straight hydraulic oil.

Because of its proximity to Pittsburgh and the Bureau Experiment Station, the mine chosen for the test was Harwick, operating in Thick Freeport coal in the Allegheny Valley about 18 mi northeast of Pittsburgh. The entire production is mined with ripper-type continuous miners using pickup loaders for cleanup and for surge capacity to accommodate single shuttle-car haulage to track loading points. Four of the five continuous miners are equipped with hydraulically-operated rotary roof-bolting drills enabling bolts to be installed while the machines are mining.

The hydraulic oil system capacities of the equipment on each production section are:

	Gal
4JCM continuous miner	65
8BU loading machine	8
5SC shuttle car	6-18

While the incidence of oil loss from the loading machine and shuttle car is small, broken hydraulic hoses account for the largest single downtime item in the continuous-miner operating shift. It is not uncommon to lose a large part of the oil in the system before the operator is aware of the loss. Such an occurrence, coupled with a blown trailing cable, could be disastrous; hence our interest in a trial installation of a water-in-oil flame-resistant hydraulic fluid.

Fluid Test

In January, 1958, arrangements were made with the Shell Oil Co. for a trial installation of a water-in-oil emulsion designated as Shell 3XF Mine Fluid. It was installed in a 5SC shuttle car and has been in continuous use to date. After more than 1 yr experience with the fluid in a shuttle car the fluid was installed in the continuous miner and the loading machine in April, 1959, completing the replacement of oil with 3XF fluid in the equipment in a producing section. This section has continued using the fluid to date. The fluid also is being used in the transmission case of the loading machine and in the crank case of a John Bean high-pressure water-spray pump with apparently as good results as oil.

In May, 1959, A. S. Morrow, senior engineer, Industrial Application Dept., Shell Oil Co., presented a paper at the American Mining Congress Coal Show in Cleveland, Ohio, describing the fire-resistant qualities of 3XF fluid and recounting field trials of the fluid including its use in the 5SC shuttle car at Harwick Mine. His paper, entitled "Fire-Resistant Hydraulic Fluids for Coal Mines," was published in the **Mining Congress Journal**, May, 1959, and the reader is referred to this source for additional information on the characteristics of the fluid, which will be described briefly here.

Water-in-oil emulsion	60% oil—40% water
Specific gravity	0.9165
Color	White
Neutralization no.	0.12
Specific heat @ 100 F	0.68
Coefficient of expansion	0.0003
Viscosity—SSU:	
@ 40 F	2,180
@ 100 F	367
@ 180 F	98.5
Viscosity index	144

The fluid is available in both premixed and concentrate forms. The following tabulation is a comparison of two products:

	(Concentrate) Shell 3XF Mine Fluid	(Premixed) Shell FR Mine Fluid
1.	**Economics** Single drum price, 98c per gal. By addition of 40% water, price becomes 58c per gal.	Single drum price, approximately 85c per gal—40% water already added.
2.	**Storage** Handle like any hydraulic oil. Does not require inside storage until water is added.	Must be kept above freezing. Present storage tanks would permit freezing. Requires some agitation.
3.	**Mixing** Use Lightning mixer in mixing tank with automatic water shutoff. Extremely stable emulsion.	Premixed 60% oil —40% water. May need some agitation if permitted to stand.
4.	**Labor** Approximately 10 min required with above mixing setup.	
5.	**Water** Using ordinary drinking water at mine. Do not have to pay freight on water shipped, as in premixed form.	Required to pay freight on water added.

From a paper presented at the 1960 meeting of the Mine Inspectors' Institute of America.

Mixing—At Harwick mine we use the concentrate form and do our own mixing, adding ordinary drinking water. The following method is used:

Proportion: 3 parts Shell 3XF Mine Fluid to 2 parts water.

Mixing: 183-gal batches.

Mixing Method: 110 gal of Shell 3XF Mine Fluid is placed in a 300-gal tank; 73 gal of water is fed into the 3XF over a period of 15 min while mix is being agitated by a Lightnin mixer. After water is added mix is agitated an additional 30 min, and then is placed in 5-gal cans to be sent into the mine for use.

Other methods that have been used for mixing are:

1. Recirculation with (a) small piston-type pump (previously used on Steam Jenny); (b) "Handy Pump," Model No. 8021H impeller, 7,500 rpm, Gorman-Rupp; (c) gear pump, same as on Joy equipment.

2. Agitation with compressed air at 100 psi introduced into mix through perforated copper tube installed in bottom of mixing drum.

The mix obtained by the other methods worked satisfactorily as far as we could determine. Shell is of the opinion that the method now being used produces the best mix.

Originally the mix was taken into the mine in 55-gal drums from which fluid was dispensed as needed. However, it was discovered that after a few days stratification of the mix occurred and the drawoff from the bottom of the drum contained more water than oil. It was then decided to dispense the original mix in 5-gal cans to guard against such stratification.

Operating Results

The recommended maximum operating temperature of 3XF is 150 F to guard against excessive water loss by evaporation.

When first put into a shuttle car, which has a normal capacity of 6 gal, considerable foaming and high temperatures were experienced—as high as 190 F while the shuttle car was standing still with 450 psi against the high-torque relief valve. When the shuttle car was tramming the temperature would drop to about 170 F but foaming continued. An auxiliary tank with a 12-gal capacity was placed in series with, and about 2 ft above, the original 6-gal tank. With this arrangement the maximum temperature has not exceeded 120 F in the shuttle-car fluid system.

Temperatures in the continuous miner and roof-drill systems do not exceed 150 F, compared to 170 F with oil. The fluid definitely runs at lower temperatures than oil.

Oil vs. Fluid

The following is a comparison of hydraulic-unit replacements on the section using fluid with average replacements per section using oil during 1 yr of operation, April 1, 1959-April 1, 1960.

Units Replaced for Repairs

	3XF Fluid	Hydraulic Oil
Cont. miner pumps	5	2.75
Roof-drill components:		
Pumps	3	0.25
Rotation motors	1	0.25
Feed motors	1	0.25
Shuttle-car pumps	3	3.25
Loader pumps	1	1.00

The results are not as unfavorable to fire-resistant fluid as they appear. The experience on shuttle cars and loading machines is quite comparable. The experience with continuous miners and roof-bolting drills is biased by the fact that the section using fluid was on development continuously while all the sections using oil were on pillar recovery. Mining is considerably easier on the machine in pillar work in Harwick mine and may explain the variation in continuous-miner pump units replaced.

As to replacement of roof-drill units it is probable that the development-section drill-use factor was from 3 to 4 times as great as the average use factor in a pillar section. In other words, 3 to 4 times more roof bolts are installed per shift in development than in pillar recovery.

For our own satisfaction, we will install the fluid in two of the pillar sections and replace the fluid with oil in the development section to see if the preceding conclusions are correct. We will then have a comparison with fluid vs. oil in development, as well as fluid vs. oil in pillaring, under conditions which should be reasonably comparable.

Cost—The consumption of fluid per shift was quite comparable with that of oil, averaging between 5 and 6 gal. Using the tonnage and oil consumption for 1958 and assuming fluid had been used instead of oil our calculations indicate a cost per ton of $0.0076 for oil and $0.0186 for fluid, or $0.011 per ton more for fluid. Average cost of oil per gallon was $0.247 per gal. Fluid cost, with concentrate at $0.98 per gal, was $0.605 per gal, including a total added cost for mixing, water and power of $0.017 per gal.

Hydraulic Equipment—It should be noted that all the pumps and motors involved in this test were of the gear type. We have had no experience with vane or piston-type equipment.

Filters—No filters other than the cuno-metal leaf-type filters, originally installed by the manufacturer were in service during the test period. We have been told that because of the shear characteristics of the fluid, filtration media should have larger interstices. For example, if the openings are equivalent to 100-mesh (0.0058 in) using oil, they should be 60-mesh (0.0097 in) for fluid. Actually this was not a factor in our test, since we had long ago decided that, with negative head on most of our hydraulic systems, together with 0.015-in-opening leaf filters on the suction side, we were starving our pumps. We therefore removed every other leaf in the filter unit, increasing the openings to about 0.040 in and definitely improving performance with marked decrease in maintenance. Thus the openings in our filter media were about four times the minimum recommended for fluid.

In summation, we have used fire-resistant fluid for 2 yr in a shuttle car, operating at lower temperatures and experiencing no more maintenance than with oil. A complete producing section used the fluid for 1 yr and performance was satisfactory. Allowing for variation in mining conditions it appears that maintenance using fluid or oil is comparable. Cost of fluid is somewhat more than $0.01 per ton higher than oil.

Warwick Test

Since September, 1959, Socony Mobil Oil Co. has been testing fluids

in a 10SC shuttle car at Warwick mine. The following is a quotation from a report by Arthur W. Yoder, chief engineer of that company, with which our field personnel concur in regard to operating experience:

"Test equipment .... Joy 10SC shuttle car

"Capacity of system .....15 gal

"Pump in service ..... Gear-type at 1,500 psi

"Average oil temperature ..... 140 F-150 F

"Test started ..... Sept. 25, 1959, with TL-5

"Improve product change ..... Jan., 1960, with XTL-10

"Test termination ..... Continuing and satisfactory

Laboratory Results

"Lab. Number	173472	174921	178921
"Sample of	TL-5	XTL-10	XTL-10
"Sample date	Dec., 1959	Jan., 1960	Mar., 1960
"Sample received	1/19/60	2/9/60	3/28/60

Analysis

"Viscosity, SSU/100	530	498	...
"Water, ASTM, %	36.4	38.8	39.6
"Gravity, API, 60/60 F	21.6	22.8	22.5
"Spec. Gr., 60/60 F	0.924	0.917	0.919
"pH	8.3	7.8	8.5

"Both TL-5 and XTL-10 are water-in-oil emulsions. Both products form stable emulsions and during the course of operation they continue to rehomogenize due to pump action. The approximate water-oil ratio is 40% to 60%. These fire-resistant hydraulic fluids also contain a vapor-phase rust inhibitor, which means that as water vaporizes due to temperature a rust inhibitor is carried along to give protection in the reservoir above the emulsion level; also, protection is secured in the upper sections of the valves and return lines not having full liquid flow.

"The basic difference between TL-5 and XTL-10 is that of high temperature limitations. The first test product, TL-5, because of product formulation, was recommended for service conditions where oil temperatures were 150 F or lower. This was recognized as a potential limitation to the mining industry and therefore, through product research, XTL-10 was developed to allow oil-temperature service up to 195 F. In addition to the temperature improvement an added characteristic of antiwear properties was gained.

"The above laboratory results indicate a fairly uniform consistency of product. Actually, the slight variations are in accord with the percent of water, which can vary as make-up oil is added. It is interesting to note that water content remains closer to the 40% figure for the improved higher temperature XTL-10.

"Results secured in the testing of TL-5 and XTL-10 at the Warwick mine for a period of 6 mo are quite good in that hydraulic operations have been positive, no sluggish conditions prevail, pressures have been uniform, no emulsion factors or sludge have been encountered, and no measurable pump wear has been recorded."

It should be added to the preceding by Mr. Yoder that the operating temperatures of these fluids was lower than that of oil, the difference being comparable to that noted with the fluid at Harwick mine.

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MODEL NO. 642
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Combines safety of screw jack with fast action of crank. Head swivels. Five models with min. ht. from 3'6", max. ht. to 9'6".

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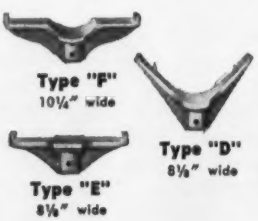

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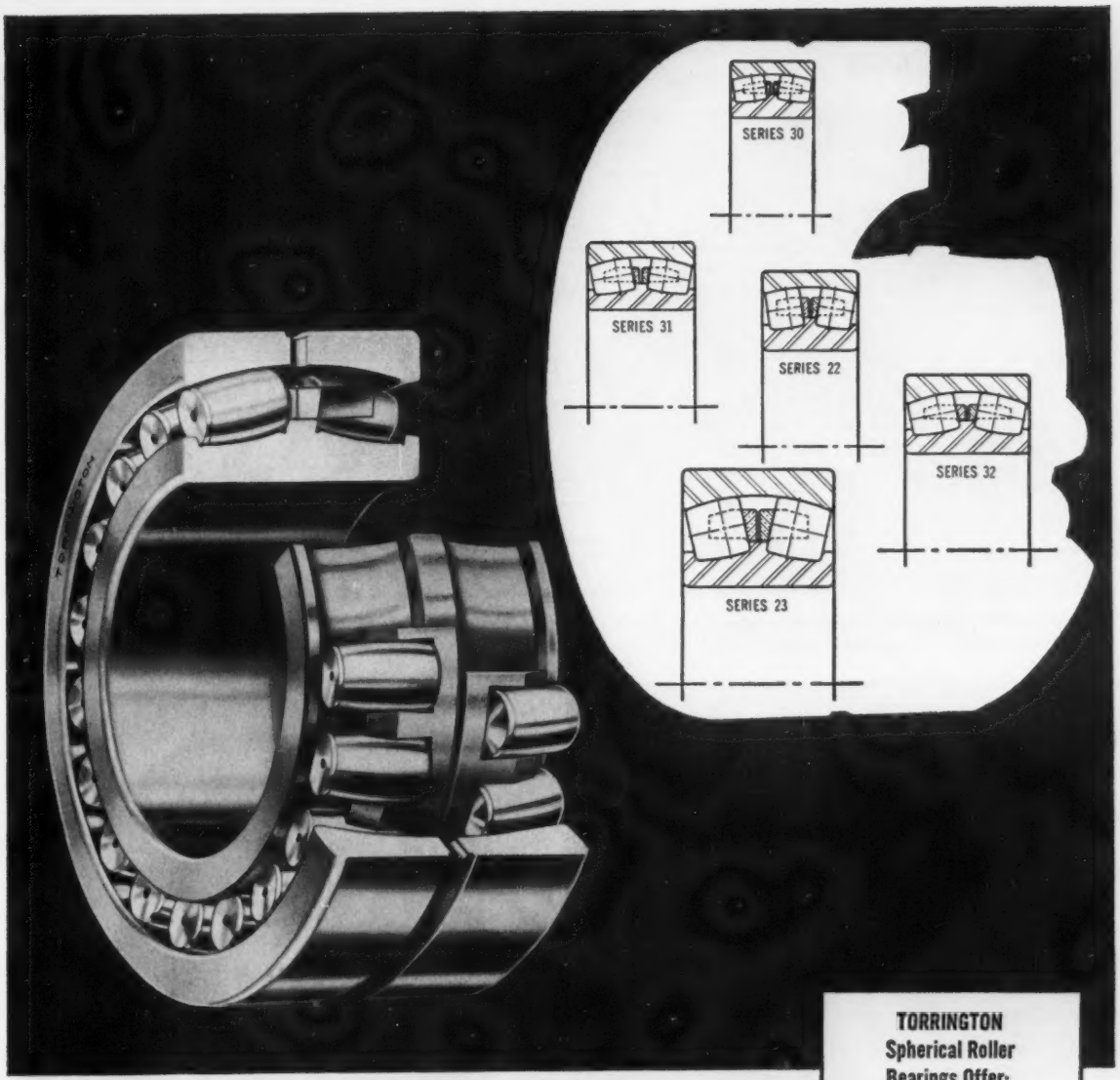

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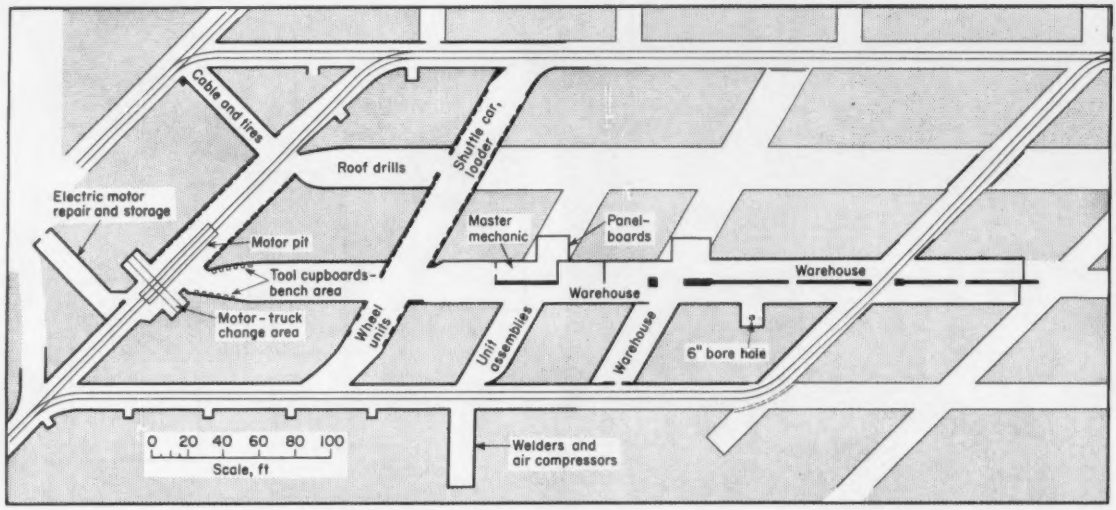
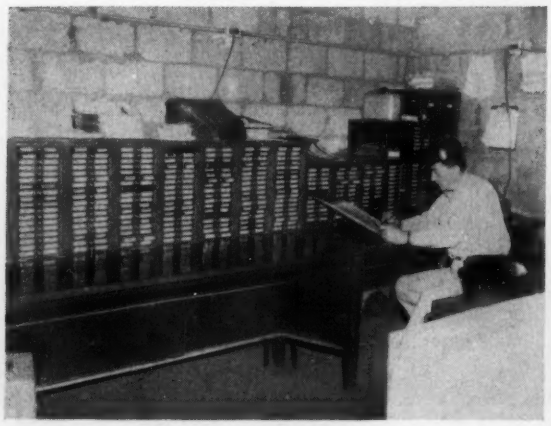


NEW UNDERGROUND SHOP at Mathies Coal Co. has facilities for rebuilding all types of mining equipment. Located 8 mi underground, the shop covers 1,600 lineal feet of entry, has special areas for rebuilding each type of machine.



KEEPING PERPETUAL INVENTORY of all parts in underground supply room is daily assignment for warehouseman.

SUPPLY CENTER covering 210 lineal feet of entry in shop stocks all the materials needed to rebuild equipment.

New Underground Shop Improves

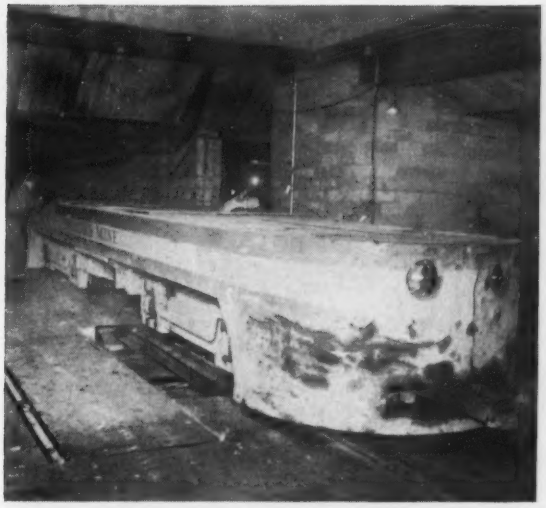
Located 8 mi underground and employing 31 maintenance specialists, Mathies' repair center handles complete rebuilding in special work areas.

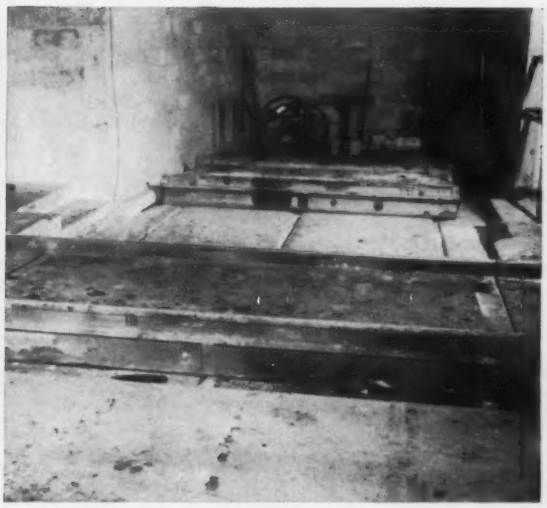
REPLACING an underground shop that had served the mine for more than 10 yr, a new, larger and improved maintenance center boosts maintenance performance at Mathies Coal Co., Finleyville, Pa.

Located 8 mi underground at a junction of two main entries and employing 31 maintenance specialists, the new center is responsible for all major rebuilding as well as shop work required in day-to-day maintenance. To enable the maintenance men to work most effectively, the shop is divided into major work areas. Each of these areas is equipped to handle complete rebuilding of a specific type of machine, such as, loader, cutter, roofbolter and so on.

Mathies Equipment

Mathies mine produces 18,000 tpd of raw coal in three-shift operation. This tonnage comes from 15 working units, one of which is continuous-miner and the remainder conventional units. Equipment assigned to conventional sections includes two 14-BU loaders, two 10-SC shuttle cars, one





FAST CHANGING of trucks under big 50-ton locomotive (left) is possible with 10-ft wheel-mounted sections of track (right). Two men change a set of trucks in 1½ hr, a job that formerly required 3 man-shifts.

BATTERY-POWERED fork-lift truck carries heavy parts and unit assemblies from warehouse to work areas.

MASTER MECHANIC MIKE ROCCO directs activities of 31 maintenance men at the underground maintenance center.

Maintenance

Jeffrey, Joy or Goodman cutter, two Fletcher roof-bolters, one Joy CD41 or CD 33 coal drill and one Stamler hydraulic car spotter. The continuous miner section employs a Joy 1JCM with roof-bolters, 14-BU pickup loader two 10-SC shuttle cars and a Stamler car spotter.

In addition to rebuilding the coal-producing equipment, the Mathies shop is responsible for maintaining two 14-BU loaders employed in cleaning up rock falls and two 8-BU loaders assigned to light cleanup work in connection with mainline track work. Mathies uses 13 General Electric and Jeffrey haulage locomotives, ranging in size from 24 to 50 tons, and has another 24 locomatives for miscellaneous work. All of these units are serviced at the underground shop, as are four Lee-Norse Portabuses and five Jitneys. The company's 900 U.S. Steel and Irwin mine cars are repaired in a separate shop near the rotary dump at the preparation plant.

Now that maintenance facilities are closer to center of mining activity, Mathies management notes that equipment can be moved to or from the section faster and a mechanic or part can be rushed to the face to make an emergency repair in less time. The net result is an over-all improvement in maintenance and a corresponding decrease in down time.

Changing Trucks Fast

In the new shop layout, special provisions were made for facilities to speed changing the trucks under the big General Electric 50-ton locomotives. In the locomotive repair section of the shop the company built two 10-ft-wide offsets at right angles to the shop track. These offsets face each other on opposite sides of the shop track and also have three rails extending from the back wall of one

SPECIAL WORK AREAS, like this loader-rebuilding center, are provided for all major equipment. Company has specialists for each type machine.

to the back wall of the other offset.

The company built two wheel-mounted sections of track on steel bases and installed them on the rails in the two offsets. One of the wheel-mounted rail sections always remains in place to bridge the gap in the shop track. The other movable section remains in one of the offsets, usually with a spare set of locomotive trucks on it.

To change a set of locomotive trucks, two men of the shop's crew position the locomotive so that the trucks to be changed are on the movable rail section. Employing an overhead traveling crane, they raise the end of the locmotive only far enough to clear the center pin of the trucks. With the trucks thus freed, the two men use a wire rope with a hook, snatch block and hoist to pull the movable track section and truck into the empty offset. Then they pull the new trucks on the other movable track section from the opposite offset into position under the locomotive.

Two men make the change in 1½ hr. Before the new underground shop facility was available it took three men all day to do the same job. Furthermore, they had to do the job outside the mine and sometimes in adverse weather.

The Maintenance Job

The responsibility for maintaining 37 locomotives, 34 loaders, 31 shuttle cars, 29 roof-bolters, 14 coal drills and a continuous miner rests on the shoulders of Mike Rocco, master mechanic. Under his direction, Mathies mines uses a three-pronged approach to get effective mine maintenance.

The key elements are:

1. Well Equipped Maintenance Facilities—Top management believes that maintenance men can do first-class work only if they have ample, well-lighted work areas. The new underground shop not only provides ample work space for all types of maintenance but also has many machines that are found only in surface shops. For instance, there is a lathe, two drill presses, hydraulic press, hydraulic-pump tester, three power grinders and four electric welders.

Aside from the special work areas reserved for specific overhaul jobs, the shop has a complete warehouse stocked with parts and materials for virtually all repair jobs. To speed repairs at the face, the shop also keeps a number of unit assemblies on hand. To provide the necessary stock of spare parts and unit assemblies, Mathies carries a $350,000 inventory of materials. The warehouseman is responsible for reordering parts and material to keep inventories in balance.

Six greasers, who work in pairs on the three shifts, also headquarter at the underground shop. These men deliver oil and grease to all sections and also lubricate equipment on sections not having a regular mechanic.

Mathies buys lubricants in bulk and stores them in tanks on the surface near boreholes. An old railroad tank car holds hydraulic oil and a buried tank stores grease. Products flow by gravity to the mine through pipes in the borehole. To refill the mine lubricant car the greasers use a hose, which connects to a valve on the bottom of the pipe.

The company schedules complete overhauls for all types of machines according to past experience and mining conditions. As a result of this planned rebuilding program most machines are overhauled once a year and maintenance at the face is minimized. Each of the special rebuilding areas always is busy tearing down or repairing a loader, shuttle car, drill or cutter. It takes about 3 wk for a machine to be torn down and completely rebuilt.

2. Maintenance Specialists—Each man works at the type of maintenance in which he has the greatest skill. As a result, there are specialists in roof-bolters, shuttle cars, loaders, locomotives and so on. These experts can dismantle and rebuild a machine much more quickly than a general mechanic and rebuilding costs thus are kept to a minimum.

All the parts and supplies necessary for a major rebuild come from the shop's warehouse. Each maintenance specialist is responsible for getting the parts for a rebuild job. He compiles a daily list of parts withdrawn from stock and leave it with the warehouseman for transfer to the Kardex perpetual-inventory system.

The specialists have access to a complete file of wiring diagrams, service manuals and parts catalogs, which are kept in the shop file. From time to time the company makes modifications in equipment designs which are added to each similar machine when it is rebuilt. Blueprints of these design changes also are kept in the shop file.

3. Spare Machines—Ample spare equipment ready to go into service on short notice plays a key role in the Mathies maintenance program. Mechanics keep a sharp watch over production units and as service hours build up they check closely for conditions that might result in a serious production delay. On finding such a weakness they recommend that a spare be put in service.

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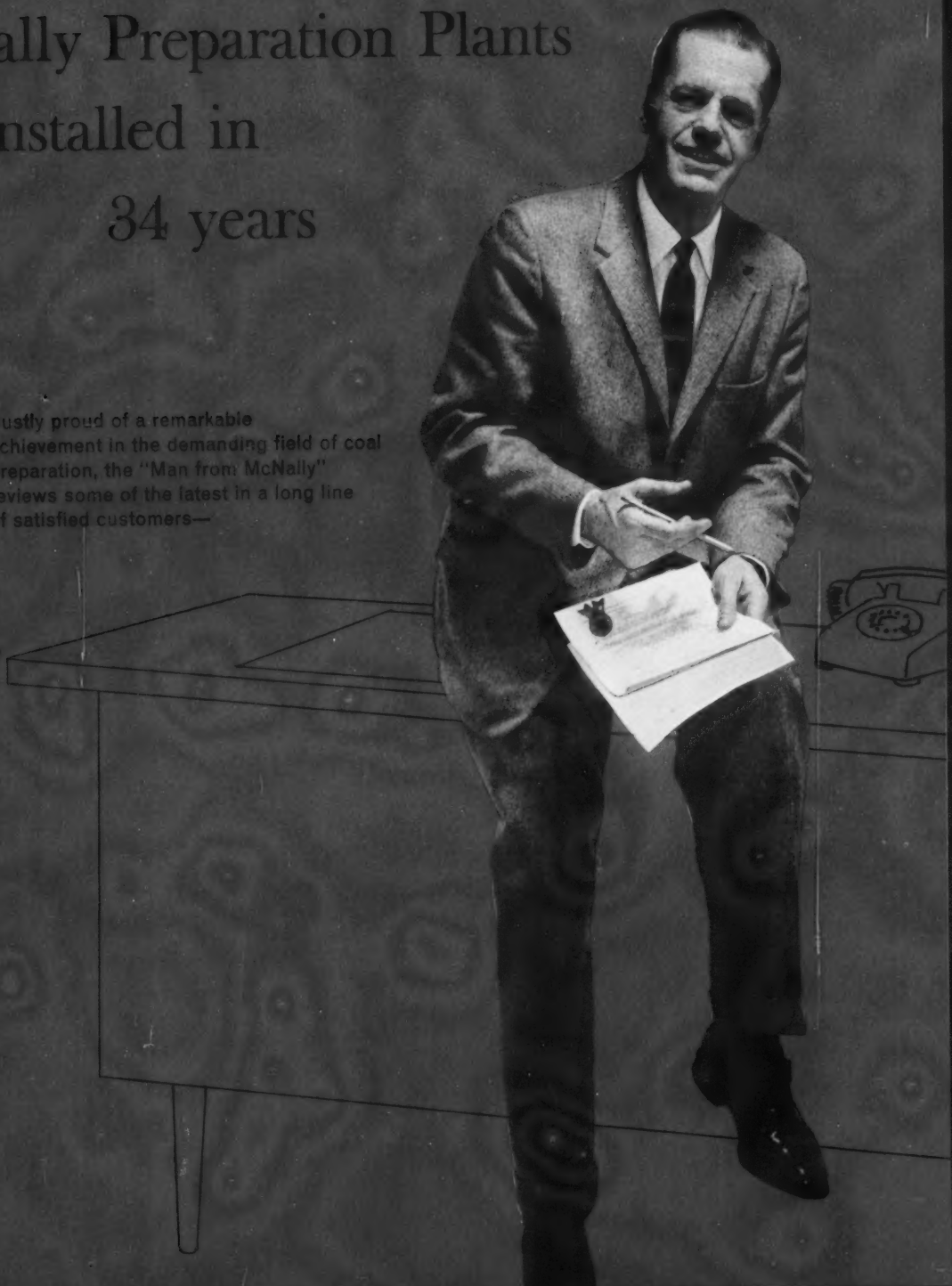

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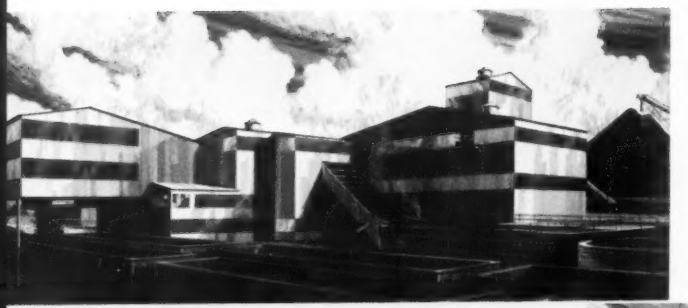

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Mine No. 1, near Parrish, Alabama

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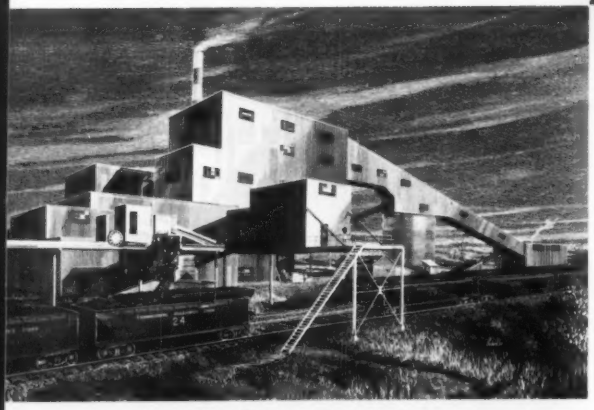

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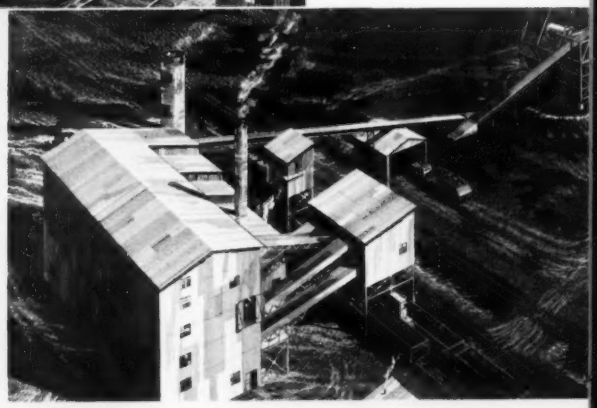

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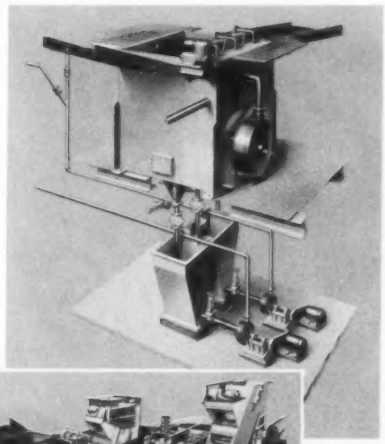
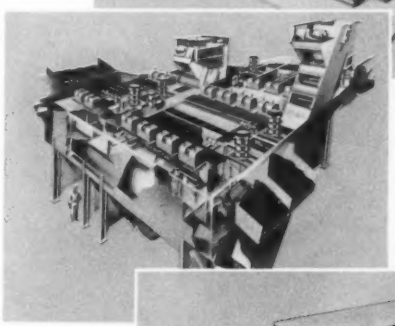
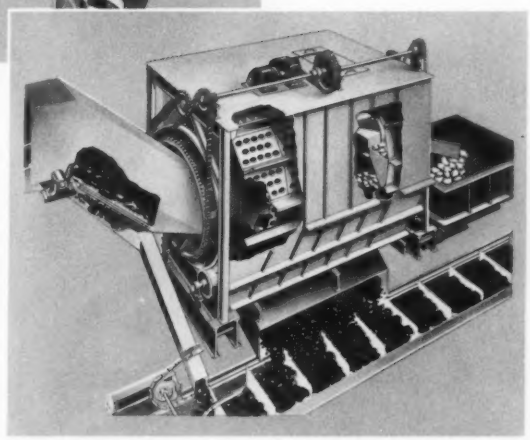


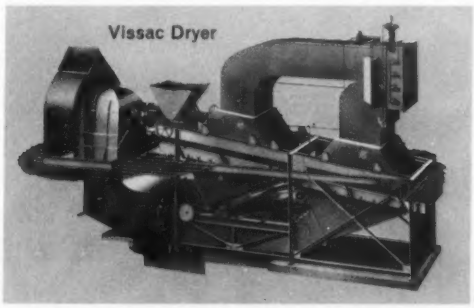
Fine Coal Washer



McNally Giant Washer



Rotary Breaker



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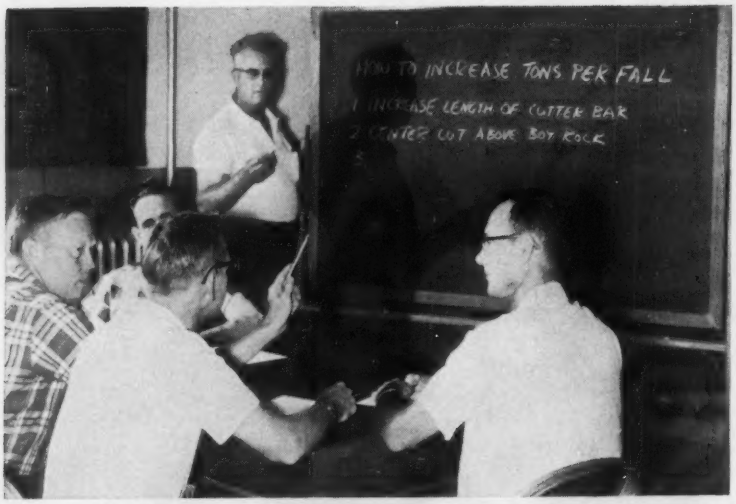


METHOD IMPROVEMENT is topic at brainstorming session led by C. W. Long, assistant mine foreman. Seated are T. C. Herron (left), transportation foreman; J. R. Barrow, H. M. Bonham and T. C. Dickerson, section foremen.

SKIT IS USEFUL TOOL in developing correct method for making a safety contact. H. E. Dolan (right), assistant mine foreman, acts as foreman making contact with J. M. Carrell, section foreman, acting as worker.

TCI Coal Mines Training Program

Walter H. Fleming
Supervisor of Training, Coal Mines, Tennessee Coal & Iron Div., United States Steel Corp., Fairfield, Ala.

THE KEY to continued improvement in efficiency is better performance in the work of managing. The core of the training program at the coal mines of the Tennessee Coal & Iron Div., United States Steel Corp. is management development. The objective is to build and perpetuate the strongest possible management organization.

This does not mean that the training of workmen has been de-emphasized. To the contrary it has been strengthened by the management-development policy. The workmen receive their training by one or both of two methods. They attend special courses and/or receive direct instruction at work on the job from the supervisor.

Supervisory managing skills must be developed to gain the most benefits from training given to workmen. If the workman has attended a special course, the supervisor needs to know what has been taught and how to help the newly trained workman apply his new skills and knowledges. The quality of instruction given on the job is dependent upon the instructional skills of the supervisor.

It is the supervisor who deals directly with the workmen. He gets them to perform safely and skillfully and turn out the quality and quantity of work needed for an efficient operation. It is for these reasons that the training program is centered around management development.

Supervisory Training Meetings

The supervisors at each of the TCI coal operations, five mines and the washer department, attend their own all-day training meeting once each month. The main topics are safety, operational procedure, cost control and leadership or human relations.

Most of the subjects are presented by local supervisors in conference-type meetings. Supervisors are taught how to conduct meetings by attending courses and review sessions in effective speaking and conference leading. They gain skill by regular practice conducting supervisory meetings and by conducting safety meetings with their workmen weekly.

Supervisory training sessions of a specialized nature and programs prepared at corporation or division level are conducted by various members of the Coal Mines general office staff.

Training is accomplished by communication. Because of this instruction and practice on how to communicate has a very important part in the coal mines program.

Courses in Effective Speaking

All Coal Mines supervisors learn basic principles of speech-making in a five-session course soon after their

appointment to a supervisory position. They quickly gain their first experience in this field by holding weekly group safety meetings with their men. The development of speech-making skills is continued as the new supervisor attends, observes and, as soon as practical, starts conducting sessions the regularly held supervisory meetings.

A more advanced course, called "Instructor Guidance," is repeated periodically for all supervisors. In this course the technique of conference leading is taught and practiced. The critique after each practice is more exacting than that given in the initial speech-making course.

There are other forms of communication necessary for information to flow properly upward, downward and horizontally.

The techniques of good communication by letter, written instructions and procedures, and face-to-face conversation also are covered in training sessions in addition to the emphasis it gets in the daily course of the job.

Agenda for Regular Training Session

The Coal Mines management-development program may best be explained by showing the agenda for a typical monthly meeting and describing how subjects are prepared and conducted.

In an all-day supervisory training session periods will be devoted to safety, human relations, an operational subject and cost control. A typical schedule published a month in advance of the testing date is as follows:

1. **Safety** (Two hours, to be prepared and presented by local personnel)

A. Correct Method for Making an Individual Safety Contact (chairman and two men for role-playing required):

1. Select two foremen to take part in role playing skit, one to act as foreman, the other as workman.

Have the foreman make an individual safety contact with the workman using a job-safety analysis.

2. After contact has been made, chairman will hold a group discussion to bring out good and bad points of the contact.

3. Develop, by discussion, the most effective way to make an individual safety contact.

B. Accident Review:

1. Select man to describe and discuss the reports furnished by the Safety Dept. of accidents that have occurred in own company and outside companies and to be prepared to lead a discussion on what we can do to prevent similar occurrences.

C. Review Chap. III of *Principles of Accident Prevention in United States Steel:*

The session will be conducted by the local safety inspector.

D. Unsafe Acts and Practices:

1. Select a man to review and discuss the published report of unsafe acts and practices observed by foremen.

E. Group Safety-Meeting Practice:

1. Select a man to practice holding next week's group-safety meetings.

II. Human Relations (one hour, to be presented by the superintendent of industrial relations)

The subject for this session is "How to Give a Constructive Reprimand."

III. Operational Subject (Two hours, to be prepared and presented by local personnel)

Subject to be covered will be selected by local management.

IV. Cost Control (Two hours)

A. Cost and Performance:

1. Select a man to review and lead a discussion from the latest cost and performance report.

2. Develop by discussion means to improve areas that show an unfavorable variance.

B. Brainstorm Session to Develop Method Improvements:

1. Divide members into groups of five and assign a leader for each group. Each group is to select a job and brainstorm it for ideas to make it safer, reduce cost and increase production.

Communication Skills Developed

Apart from instruction that increases job knowledge, the conference-leading skills of the supervisors are improved by participation in the meetings.

In the schedule shown, nine supervisors and one staff member take active group leader roles by conducting sessions. This same schedule is held at each of the six operations and the number of supervisors leading conferences is multiplied to 54. The same staff member is scheduled for all six meetings. Thirty or more other supervisors lead the "groups of five" as they brainstorm operational job procedures.

A further example of the important role that communication has in training may be illustrated by describing the safety sessions from the background of preparation to getting desired information to and from the workman. Previous training in effective speaking, conference leading and participation in meetings qualify those selected to lead sessions or to take part in role playing.

The role-playing skit in which an individual safety contact is demonstrated, using a job-safety analysis, has much background of a training nature. The individual safety contact and the job-safety analysis both are from the corporation program called "Operations Attitude." In this program all foremen are taught how to make individual safety contacts. The job-safety analysis is a written procedure for performing a job safely. These analyses are developed by foremen with the help of workmen. The workman's contribution is just one phase of upward communication.

All foremen receive training in developing job safety analyses and in making individual safety contacts by attending a corporation-prepared safety course in which a textbook, ***Principles of Accident Prevention in United States Steel***, was studied and discussed in conference-type meetings.

The unsafe acts and practices section of the program has its origin when a foreman, making a safety observation, sees a man perform an unsafe act. The foreman calls the man's attention to the unsafe act and then either lets the man explain to him or he explains to the man why the act is unsafe and how the job should be

performed to prevent an accident.

The foreman makes a record of the contact for the safety dept. The safety dept. selects some of the unsafe acts for publication, without reference to the foreman or man. The supervisory training program affords a communication channel that permits this information to flow upward from one source and then back down for full coverage with all workmen that may benefit.

The leader of the accident-review session is furnished reports of pertinent accidents in the mines of the division, corporation and/or other companies. The leader gives clear descriptions of the accidents, using chalkboard or other aids, so that the group can decide how to prevent similar occurrences. The foreman gives this information to the men via safety meetings and/or individual safety contacts.

In group safety-meeting practice sessions the selected leader conducts a safety meeting as he would with his men. There is a critique following the practice presentation to enable the group to make constructive suggestions from which all foremen may benefit when they present the same subject to their workmen the following week.

Other subjects (operational and cost control) of a local nature are handled in the same manner as the safety subjects. The objective is not only to increase job skills and knowledges, but also to improve leadership skills of foremen by having them prepare and conduct training sessions.

Some subjects in supervisory training are handled by general office staff members. The human-relations subject shown in the typical schedule is an example. In this particular session, the superintendent of industrial relations prepared a slide presentation aimed at selling the foremen on a way to reprimand constructively. The theme of the session was that a foreman can correct a man and still retain his friendship—if he has the "know-how." Each foreman was given an 8-pp printed guide in connection with this subject to be used for reference and further study.

Special Training Courses

In addition to regular monthly meetings special courses are given foremen to aid them in dealing effectively with their men. Some of these courses are briefly described below.

Job-relations training teaches the fundamentals of good human relations. Its main points are: let each worker know how he is getting along; give credit when due; tell people in advance about changes that will affect them; make full use of each person's ability; and treat each person as an individual. Another facet of this course is teaching foremen how to handle problems when they do arise by using four check points: (1) get the facts; (2) weigh and decide; (3) take action; and (4) check results.

Job instruction training develops the teaching skills of foremen. This is the familiar four-element method for teaching a man how to do a job: (1) prepare the worker—to get him at ease and to get him interested in learning what he is about to be taught; (2) present the operation—tell, show and illustrate one important step at a time. Instruct clearly and completely but no more than the man can master; (3) try out performance—have the man do and explain the job. Errors are corrected before they become habit, and (4) follow up—put the man on his own, check frequently and give additional instruction to refine his performance until he is ready for normal supervision.

These four elements are not performed consecutively as listed. The foreman must keep the man at ease throughout the entire instruction period. He may present a small part of the job, have the workman perform it and then present another segment of the job.

Follow-up does not end immediately after the try-out performance. It goes on into the actual job to see how the workman is adjusting to and performing the job. Follow-up also enables the foreman to measure the effectiveness of his instructional skills, shows him where to provide needed assistance and helps him spot additional training needs.

A most important phase of this course is teaching and showing foremen the advantages of having a systematic plan for training their workmen. They can constantly improve the skills of their men, have replacements ready when vacancies occur and operate at top efficiency when regular men have to be relieved. There is no better way to knit the crew into a team and boost morale.

A third special course which all foremen attend is Principles of Accident Prevention in United States Steel. This course is based on a textbook, which is given to each foreman. Each of the ten chapters in the book is a subject for sessions. The subjects are: (I) Introduction to Accident Prevention; (II) Accidents — Nature, Causes and Results; (III) Basic Accident-Prevention Strategy; (IV) The Foreman's Accident Investigation and Report; (V) The Single Objective Safety Program; (VI) Job-Safety Analysis; (VII) Training Men to Work Safely; (VIII) The Foreman's Safety Observations; (IX) The Foreman's Safety Inspections; (X) Employee Safety Responsibilities. In addition to the special course, individual chapters of the textbook are reviewed in each regular supervisory training meeting.

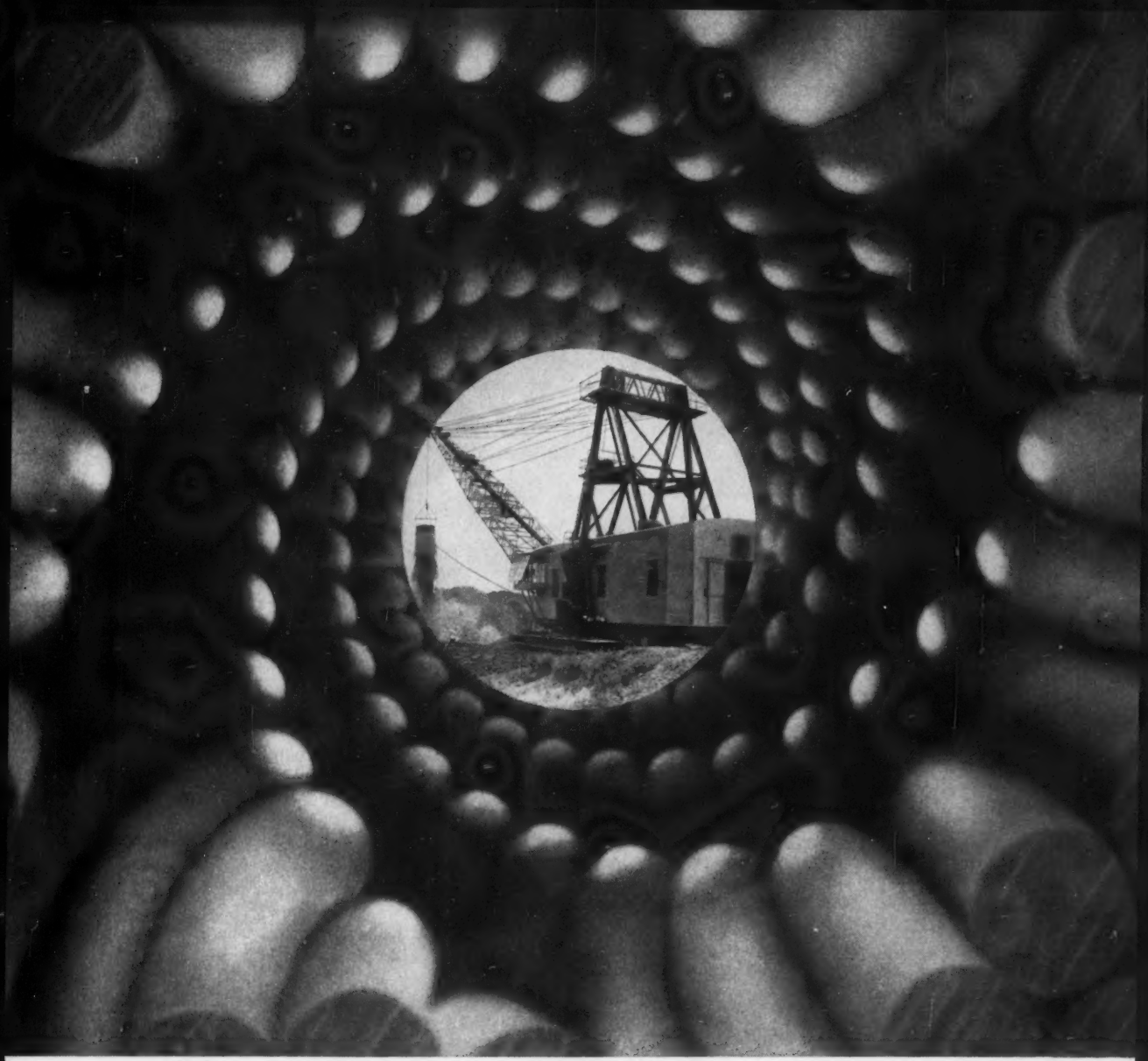
Basic Program Fits Training Needs

The main objective of the training program, as stated before, is to build and perpetuate the strongest possible management team.

Management development falls into five areas: (1) knowledge of the work; (2) knowledge of responsibilities; (3) skill in improving methods; (4) skill in leading, and (5) skill in instructing. Supervisors must continually grow and improve in all of these areas. Information given them is accepted and understood better if good communication techniques are used. Supervisors, in dealing with workmen, are better able to pass on and receive needed information if they know and use good communication techniques.

The Coal Mines supervisory training program is a regular and important phase of management duties. The regularity of the meetings and the skill supervisors have in conducting sessions puts the Coal Mines in a position whereby almost any type of training needed can be given with nominal preparation.

This program does three things continually to strengthen the management team: (1) it brings together supervisors at various levels to exchange ideas; (2) it is self-generating, since solutions of problems and establishment of procedures come from the participants; (3) instead of an occasional shot in the arm it is continuous.



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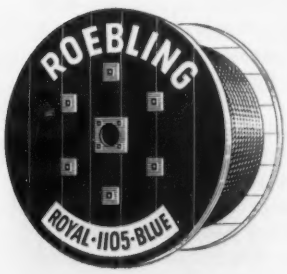

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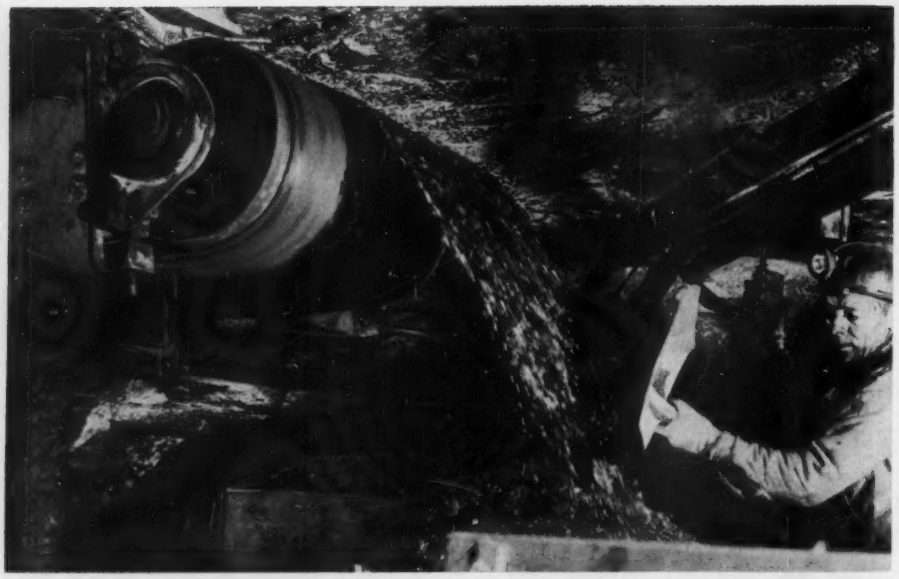


MOVING THE COAL — Continuous availability, low installation and operating costs, reduced loading delays, low power costs, minimum maintenance and adaptability to automatic operation are among reasons for choice of belt haulage.

Belt-Haulage Economics

Factors in belt-haulage performance.

Mainline installations at ten properties.

Estimating installation and operating costs.

Arnold W. Asman
Product Manager, Mining Dept., Hewitt-Robins, Incorporated

MINE HAULAGE by belt conveyor is steadily gaining because conveyors, when properly designed, installed and maintained, result in important cost savings. In 1958 alone more than 100 mi of belt conveyors were purchased and installed by mining companies.

One coal mine which recently converted from rail to belt haulage cut operating transportation costs two-thirds. Another company has operated an all-belt mine for more than 10 yr and is the recognized productivity leader in underground bituminous coal mining. The savings are not all in haulage operating costs per se. Changing to 100% conveyors raised *faceman* output from 28 to 40 tons per shift in a large West Virginia mine.

Some of the factors behind these records are:

1. Haulage availability is of utmost importance in any material handling system. Actual records at a large all-belt mine show that the conveyor system is available an average of over 95% of working shift time.

2. Operating cost of belt conveyors is less than for any other system of haulage. Mine conveyors require no more than one man for patrol per mile.

3. Installation of conveyor equipment is less expensive, and less time-consuming. A recent 4-flight belt haulage system for a coal mine was completely installed in 14 shifts, using 7-man crews.

4. Loading delays are greatly reduced because conveyors are easily moved and extended. One coal mine makes a 160-ft extension in less than 45 min. Other mines have conveyor equipment which can move to a new location during a normal loading machine place change.

5. Power costs are less with conveyors operating on grades. More economical AC electrical equipment can be used with belt conveyors. Fluctuating power peaks are avoided, reducing costly demand charges. At one metal operation, power consumption is nil because conveyors operating downhill generate into the electrical network.

6. Maintenance supplies and labor are at a minimum with belt conveyor haulage. A coal operator in the Midwest already has used his belts 12 yr —and expects to get 8 yr more life. Inspection and lubrication of belt conveyor equipment can be done during the operating shift. Special buildings and tools are not required for maintenance.

7. Automatic and continuous haulage is possible only with belt conveyors. Electrical and other controls regulate the feed at transfers. Protective devices prevent damage due to chute plugging or belt slippage. One man at a control panel is continuously informed of the complete system operation.

The accompanying table lists some typical mainline belt conveyor installations. All except that in the last column are underground. Installation "J" is included because it reflects the possibilities of high-capacity mainline haulage even though it is handling overburden in open-cut mining. This list by no means represents the complete spread of conveyors by type of

Main Line Haulage Conveyors

	A	B	C	D	E	F	G	H	I	J
Belt width, in....	42	48	36	54	36	36	30	42	30	54
Max. feed, tph...	1,200	2,000	700	3,000	800	600	650	900	450	5,000
Production, tpd..	4,500	20,000	4,000	25,000	5,000	3,000	7,500	3,000	2,000	90,000
Belt speed, fpm..	600	650	580	500	500	380	500	450	450	850
Motor, hp.....	Dual 150	Dual 300	Single 125	Dual 500	Single 100	Single 75	Single 100	100	75	Dual 600
Flight length, ft..	3,500	4,500	3,500	2,500	3,600	3,000	3,500	2,500	4,600	4,330
Max. lump, in....	24	42	18	24	12	36	10	36	12	24
Idler dia., in.....	4	5	5	6	4	4	4	4	4	6
Type drive.....	Snubbed-head	Internal snub	Geared tandem	Snubbed head	Geared tandem	Internal snub	Geared tandem	Geared tandem	Geared tandem	Peterson
Belt Specs.:										
Plys.....	4	4	5	5	4	4	4	4	4	5
Fabric.....	CR	RN	CN	RN	CR	Cotton	CR	CR	CR	RN
Rating.....	50 lb	75 lb	50 lb	150 lb	50 lb	42 oz	50 lb	50 lb	50 lb	130 lb
Type takeup.....	Internal hydraulic	Internal hydraulic	Internal gravity	Horiz. gravity	Internal hydraulic	Internal ratchet	Internal gravity	Tail ratchet	Internal ratchet	Internal gravity
Mined mat'l.....	Coal	Coal	Coal	Ore	Ore	Coal	Ore	Ore	Coal	Overburden
Face mining.....	Conventional	Conventional	Conventional	Conventional	Continuous Miner	Conventional	Continuous miner	Conventional	Continuous miner	Conventional

mining. All operations use only belt conveyors for mine material handling. Only one flight in each of the systems is tabulated.

Installation "A" – This coal mine replaced rail haulage with a mainline conveyor system over a year ago. Perhaps more than anything else, adverse grades prompted the change. A total of six 42-in wide flights, extending over 3 mi underground, now are in service. The 42-in main line receives coal from four 36-in x 2,500-ft butt-entry belt conveyors. Entered by a drift, the mine dips lightly away from the portal.

Installation "B"—Opened 2 yr ago, this coal mine is entered through four drift portals each with a 48-in mainline conveyor. About 6 mi of mainline conveyor now is in service with additions at the rate of 3 mi per year. Four 36-in x 2,500-ft butt-entry units discharge onto the mainline belts in each of the portals. Large size of material handled is due to a 15-ft seam height with a 3-ft rock binder. Some belts are on slight decline.

Installation "C"—Started as a belt-conveyor mine several years ago, this coal operation extends its mainline system at the rate of 1 mi a year. Total footage in service, including a slope belt, exceeds 4 mi. Coal is received from 36-in room-entry belt conveyors. Grades are average and nonuniform.

Installation "D"—The 10% dip of this ore deposit dictated belt conveyors from the portal. Underground installations are elaborate with a primary crusher at the slope-conveyor tail. Panel-entry belts are 48-in wide and are loaded by truck through a double 18-in grizzly.

Installation "E" – Due to extreme depth of deposit when started, the mine is entered through a vertical skip-hoisting shaft. Approximately 3 mi of mainline conveyors are in service. The mining horizon is rolling and extensible conveyors feed the system of 36-in belts.

Installation "F"—With over 4 mi of 36-in conveyor installed, this mine is served by a 42-in slope belt. Grades underground are practically nil. The seam is thick and the coal is shot with air, hence the large lump. All room-entry belt conveyors are 36-in, and their feed to the mainline is regulated by load-control switches.

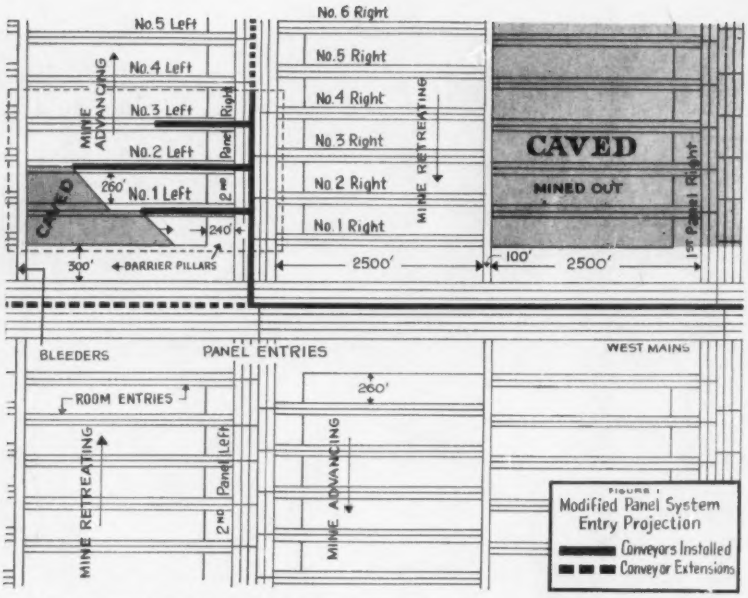
Installation "G" – Perhaps this mine has more total footage of underground mine conveyors than any other single operation. Close to 8 mi of 24- through 36-in conveyors are in service. The mainline system is 13,325 ft long, divided into seven flights. The mining horizon dips slightly in the direction of belt travel. Skip hoists are used in the main shaft.

Installation "H"—Only one level in this ore mine is completely belt conveyor at the present time. Conveying duty is severe with frequent ore pieces weighing 1,000 lb. The mine has about 3 mi of belt conveyor operating on this one level. Feeding conveyors in the face area also are 42-in. The mining horizon is essentially level.

Installation "I"—This modest but efficient coal mine has about 3 mi of 30-in mainline conveyor in service. Grades are slightly in favor of the loaded conveyor. Room entry conveyors are 26-in, and may extend to 3,000 ft. The mine portal is a hillside drift.

Installation "J"—Though not an example of underground mine haulage, this system is included to show the magnitude possible for mainline systems. Without the terminal stacker, the 54-in wide system extends 9,900 ft. In addition, two 72-in x 500-ft tunnel conveyors reclaim the storage pile. This equipment handled 60,000,000 tons in 2 yr and is little the worse for wear.

The cost of belt conveyor haulage can be estimated very accurately. Thanks to the surge of installations, recent operating data are available. Total cost of owning and operating belt conveyors ranges up from 2¢ per ton-mile. On any particular operation, the division of these costs can be accurately defined. A mine operator may be doing a good job at 15¢ a ton-mile if grades are severe and production is relatively small. It is important to know the distribution of the haulage costs and set out to improve those falling too far out of the percentile group. These calculations will help the mine owner decide to



MODIFIED BELT PANEL showing entry projection and mining sequence.

use belts in a new mine, or replace other haulage with belts in an old mine.

The accompanying plan shows a modified panel system typical of many in use today. The cycle pattern of extraction is followed working from right to left. As the West Mains advance, panel entries are turned on the right only. In 2nd panel right, No. 1 Left Butt is turned, followed by No. 2 B and No. 3 B when these places are reached. The butt entries develop to the limit, then mine room-and-pillar retreating. As production demands, 3rd panel right is worked at the same time. Panels on the left of West Mains are mined after the right side nears complete extraction. In this way, expenditures for belt haulage equipment are balanced over several years. Maximum use of all conveyors is assured.

In this example, mainline belt conveyor average capacity is 500 tph, or 6,000 tpd. resulting in a 1½ million ton output per year. Maximum momentary feed rate on the mainline system is 1,200 tph. Panel and butt-entry belts are controlled so that this amount is not exceeded.

The following tabulation summarizes the more-important specifications for a 4,000-ft flight in the mine haulage system which will do the job. Cost of mainline belt conveyor ownership and operation calculations are made for each of the following elements in the table in the material which follows the tabulation.

Mainline Belt-Conveyor Specification

Center-to-center length, ft	4,000
Lift or drop	None
Belt width, in.	42
Belt speed, fpm	600
Capacity, avg tph	500
Momentary feed rate, tph	1,200
Drive, hp	150
Takeup belt storage, ft	40
Takeup powered travel, ft	10
Carrying-idler spacing, ft	5
Return-idler spacing, ft	15
Belt splices	Vulcanized
Belt specifications:	
Number of plys	4
Ply rating, lb/in.	50
Covers, in.	3/16 × 3/32
Breakers, extra-heavy	2
USBM fire-resistant	Yes
Approximate selling price delivered	$200,000
Tons per year	1,500,000
Life of belt and machinery, yr.	10

NOTE: Price includes starters and 75-hp wound-rotor motors for a dual-motor head-pulley drive. Transformers and wiring to the starters are not included. Installation cost is excluded.

Depreciation—Allowances by the U.S. Bureau of Internal Revenue do not always conform to the useful life of equipment. The depreciation time used in this calculation is the number of years life based on design and operating conditions. At the end of that time the equipment is worn out or retired due to obsolescence. Salvage value is not considered. Mining companies should attempt to use the highest possible depreciation rate. It is more economical to buy conveyor with dollars before taxes. It is usual for most mining companies to employ a nonlinear write-off rate based on their experience in a particular area.

Installation—Cleanup of old opening and elaborate site preparation are excluded costs. The usual mining belt conveyor installation follows the face rate of advance. The cost of service haulways is not included. Installation is taken at 1½% of capital, and anticipates terminals and intermediate sections bolted to mine bottom rock, as required.

Interest, Taxes & Insurance – If money is borrowed to buy conveyors, 6% interest is the going rate. Taxes and insurance are covered by a 4% rate. The 10% total is on the average investment, calculated as follows:

$$\text{Avg. investment Pct} = \frac{1}{2} \times \left(\frac{n+1}{n}\right) \times 100,$$

where "n" is the number of depreciation years.

For our example,

$$\frac{10+1}{2 \times 10} \times 100 = 55\%,$$

which is the average investment of tota expanded.

Power—A value of 1c per kwh is taken as the large user charge. Since electrical losses occur in getting power to the motor, horsepower units are taken as equal to kw.

Labor—The equivalent of one man per 4,000 ft of conveyor is added for patrol duty. An additional man is added for maintenance and inspection. These latter functions mostly are performed off-shift. Cost of maintaining a man on the payroll, such as, compensation insurance and overhead charges, are not considered in these calculations.

Supplies – An amount equal to 1½% of capital investment per year would be expended for maintenance and replacement supplies. This would include materials for belt maintenance as well as emergency machinery repairs. The supply cost allows for inventory charges to the handling of spare parts expense.

The following tabulation shows the per-ton cost breakdown of belt conveyor ownership and operation. Similar calculations for panel and butt-entry belt conveyors would be com-

Three-Conductor Type SO Cord

Shielded Heavy Duty Cord

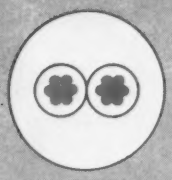
Remote Control and Drill Cord

Locomotive Reel

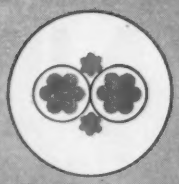
Single-Conductor Type SH

Twin Type W

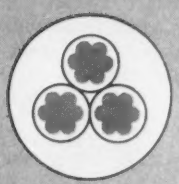
Twin Type G



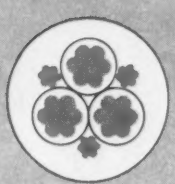
Two-Conductor Round Type W



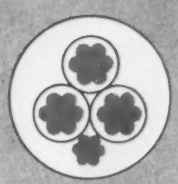
Two-Conductor Round Type G



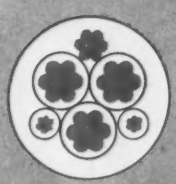
Three-Conductor Type W



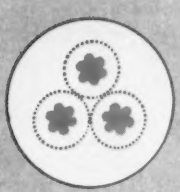
Three-Conductor Type G



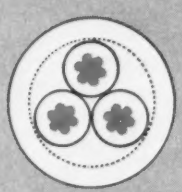
Three-Conductor Type PG



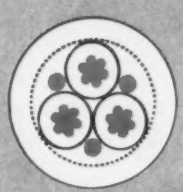
Three-Conductor Type PCG



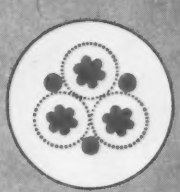
Three-Conductor Type SH-A



Three-Conductor Type SH-B



Three-Conductor Type SH-C



Three-Conductor Type SH-D

In the sectional drawings of cables, the broken lines indicate electrical shielding.

These OKOCORD cables are "job designed" to reduce your operating costs

Here are 17 of the basic Okocord constructions Okonite has developed for mining applications . . . for shovels, locomotives, shuttle cars, continuous miners and other equipment.

These tough, mold-cured flexible cords and portable cables are manufactured under the industry's strictest quality control program. Their rugged reinforced Okoprene jacket has superior flame resistance . . . plus the extra durability and flexibility that result from curing in a continuous metal mold. Insulation is tough, resilient and heat-resisting. Okocord conductors flex easily because they are formed with many fine gauge wires, twisted together with a short lay. And all Okocord cords and cables are color coded for easy phase identification.

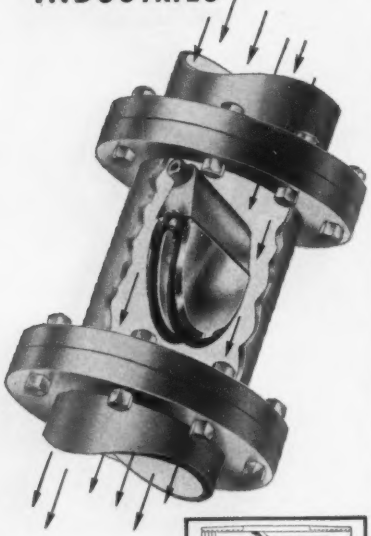
If there isn't a standard Okocord cord or cable to meet your need, Okonite will design one . . . for *any* operation.

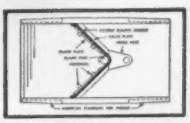
For the full story on Okocord cords and cables write for free Bulletin CA-1108, The Okonite Company, Subsidiary of Kennecott Copper Corporation, Passaic, N. J.

where there's electrical power . . . there's **OKONITE CABLE**

7223-A

A BETTER • PERFORMING
CHECK VALVE
FOR THE MINING INDUSTRIES





SILENT • SEATLESS • LOW PRESSURE DROP

Technocheck©

OUTPERFORMS • OUTWEARS OTHER VALVES • COSTS LESS TO MAINTAIN!

In field service in a wide range of water, gas, air and oil applications, Technocheck's performance and reliability are unsurpassed. Its exclusive design eliminates valve seats. Tight sealing, low pressure drop and long life with low upkeep are some of its important characteristics.

Made in a variety of metals and in Polyvinyl Chloride. Standard and custom models in sizes ranging from 1" to 36".

Write for additional information

Techno Corporation Dept. CA
16 West 5th Street, Erie, Pa.

parable. Each unit is considered on the basis of duty performed and equipment specifications. A combined cost for the entire mine would be close to that calculated for a single flight in the mainline system. Where fewer tons are conveyed, the equipment is less expensive.

Cost of One 42-In × 4,000-ft Belt Conveyor

Depreciation, machinery & belt—10 yr:
$\frac{\$200,000}{10 \times 1,500,000 \text{ tons}} = \$0.01333$

Installation, 1½% of capital:
$\frac{.015 \times \$200,000}{000,15,000 \text{tons}} = 0.00020$

Interest, Taxes & Insurance, 10% of average investment:
$\frac{.10 \times \$200,000 \times .55}{15,000,000 \text{ tons}} = 0.00073$

Power, 150 hp:
$\frac{150 \text{ kwh} \times \$.01/\text{kwh}}{500 \text{ tph}} = 0.00030$

Labor, two men @ $4:
$\frac{2 \times \$4.00}{500 \text{ tph}} = 0.01600$

Supplies—1½% per year:
$\frac{.015 \times \$200,000}{1,500,000 \text{ tpy}} = 0.00200$

Total Cost.....$0.03256

Cost per ton-mile:
$\frac{4,000 \text{ ft/flight}}{5,280 \text{ ft/mile}} \times .03256 = \$0.02467$

Operating Specifications Check List

1. Profile – Reasonably accurate elevations should be available. It is important to know if conveyor will be both incline and decline in same flight. Future application should be anticipated. Change from 5% decline to level requires takeup relocation and other design considerations.

2. Power—Conveyors are designed for average production with belt speed to take care of peak momentary feed rate. Low ambient temperatures require higher conveyor operating power. Should know if conveyor head section is located outside portal, or near portal on intake air.

3. Electricals—Open-type motors can run continuously at 10% overload. Use reduced-voltage starters on higher-horsepower motors to avoid line surges and belt-splice maintenance. Long, level conveyors take more time to bring to final speed than high-lift installations. Wound-rotor motors have starting characteristics closest to DC equipment.

4. Brakes—Holdbacks or brakes are required on inclined conveyors where slopes exceed 2%. Should use brakes on system of long conveyors to control drift. Brakes should stop conveyor in maximum distance to reduce belt-splice maintenance. Use brakes on all declined conveyors.

5. Idlers—Larger-diameter carrying idlers reduce belt damage and take less power. Precision bearings are made to closer tolerances than commercial grades and give longer life. Return idlers may be of smaller diameter if belt speed is not excessively high.

6. Belt—Resistance to impact and maximum tension determine belt selection. Thick covers and breakers are used where impact is serious. Vulcanized splices should be used on mainline conveyors for higher tension rating. Automatic internal takeups prolong conveyor belt life.

7. Loading – Make belt-to-belt transfers as close as possible. Use impact transition chute to guide load in direction of belt travel. Make chutes open with plugging-switch protection. If feeding conveyor cannot be stopped in time spill plates should protect transfer. Rubber-covered impact idlers at transfers protect belt from damage.

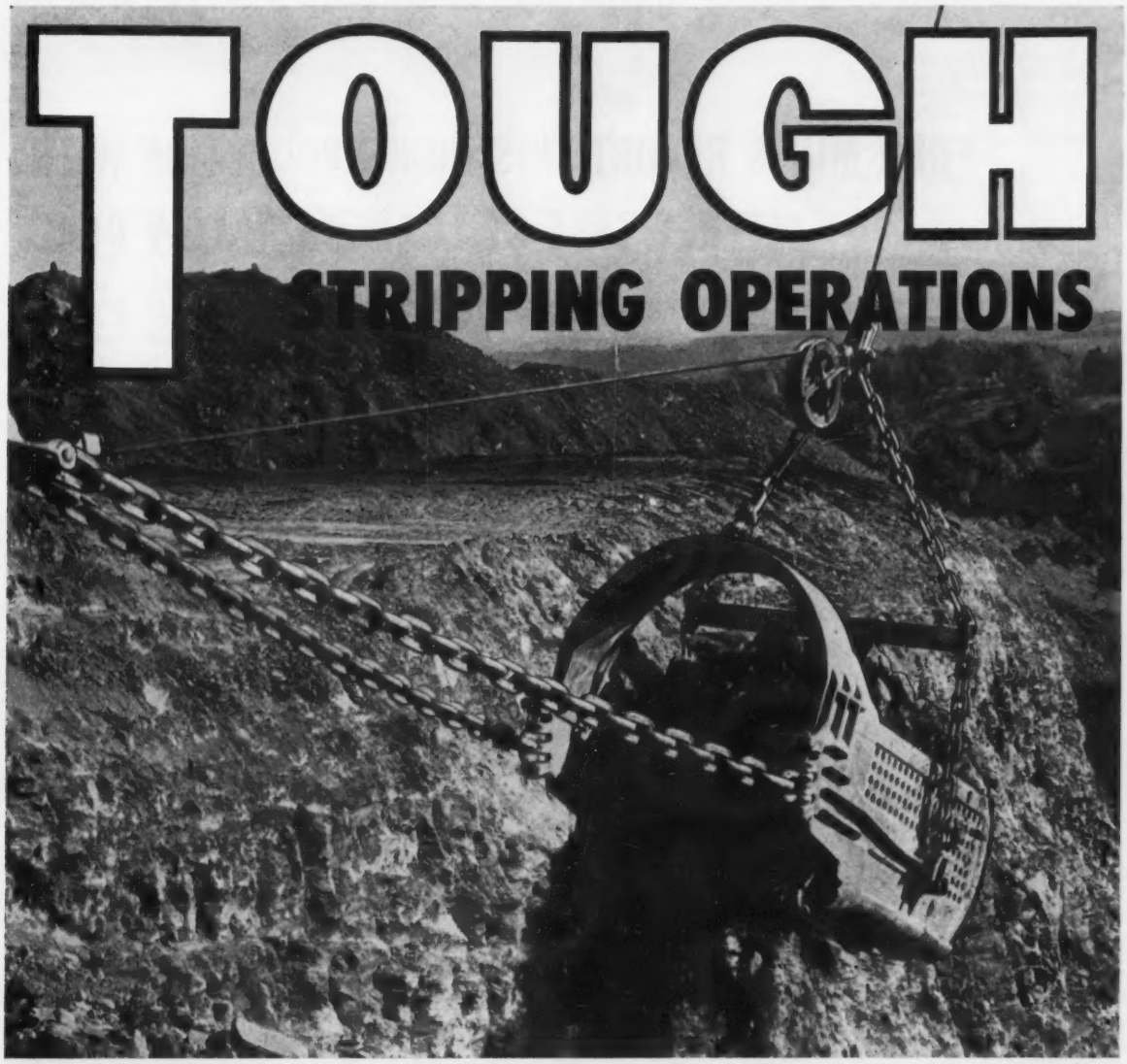
8. Lump Size—Specify maximum lump size to be handled in three dimensions. Should approximate screen analysis to show quantity of lump. Proportion of fines also is important in belt selection.

9. Material Handled—ROM coal may weigh more than 55 lb per cu ft. Loose bulk density of material determines belt width and speed. Specify if more than one material is handled. Show if continuous-miner material is handled.

10. Seam Height—Vertical clearance in a mine limits size of components. Seam height also is an indication of lump to be conveyed. Terminals can be made demountable for moving. In thin seams, equipment life is sacrificed in favor of smaller and lighter components.

TOUGH

STRIPPING OPERATIONS



"HENDRIX" MH

Heavy Duty **Mining Buckets**

TAKE THEM IN STRIDE!

4½ to 14 Cubic Yards With or Without Perforations

HENDRIX MANUFACTURING CO., Inc.

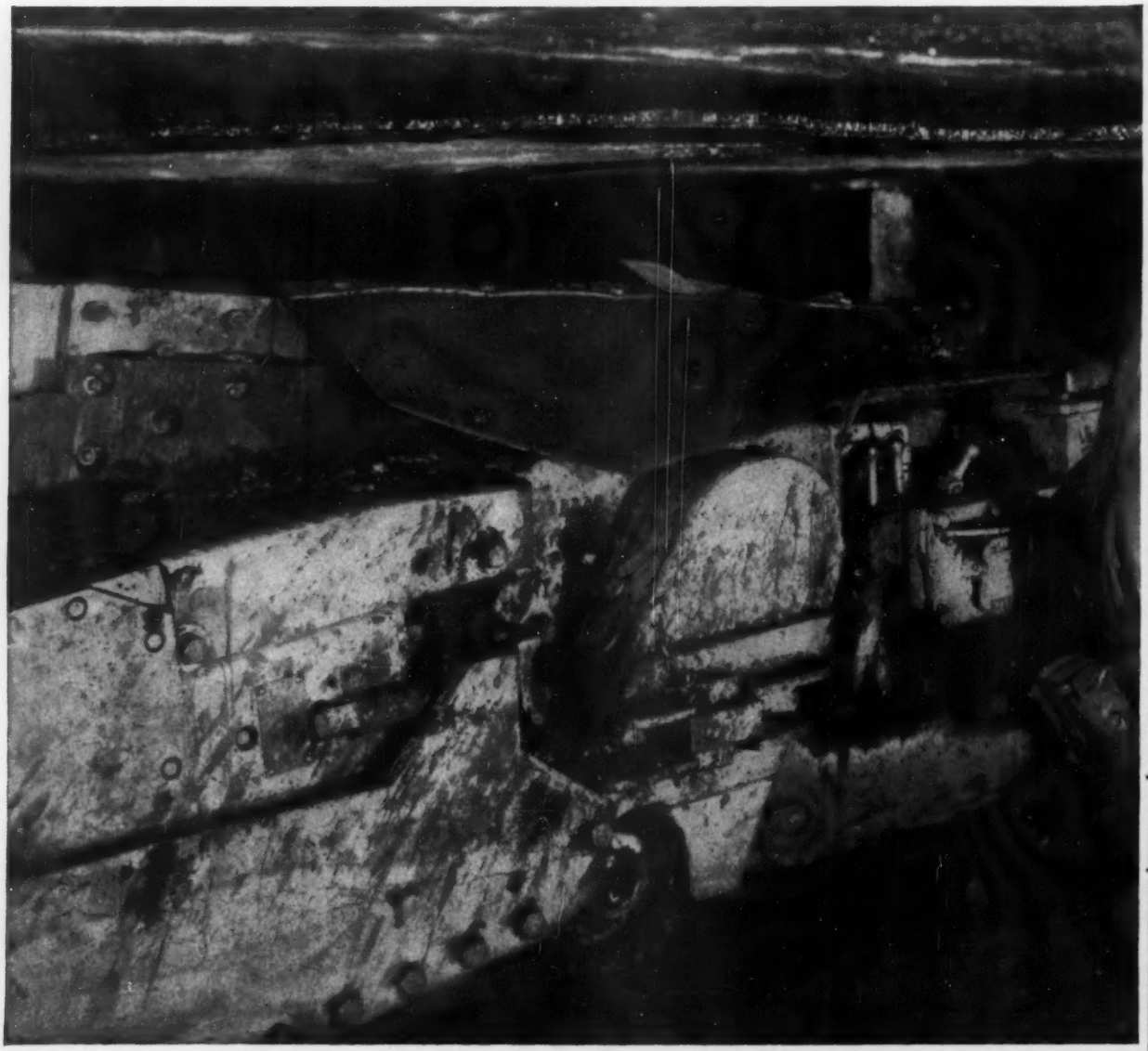
MANSFIELD, LOUISIANA

Hendrix DRAGLINE BUCKETS

FOUR MINES REPORT THIS HIGH PRODUCTION WITH JEFFREY TYPE 81 LOADERS IN LOW COAL

	Mine A	Mine B	Mine C	Mine D
Seam Height	37" to 42"	34" to 45"	32" to 40"	38" to 46"
Average Shift Production	405	425	415	440
Peak Production	672	687	718	700

ARE YOU GETTING THIS KIND OF PERFORMANCE?



Ask Jeffrey mining engineers to help you check your loading requirements. If your seam is of medium height, a Jeffrey Type 81 Loader may enable you to match the figures shown. Rated at 10 tons per minute, this Loader provides high production at low cost.

Jeffrey Loaders are available in heights from 25" to 48". They are the crawler-mounted, gathering arm type and are demons for hard work in medium height coal seams—operate equally well in conventional or continuous mining systems, digging and loading out a shot coal face or picking up the discharge from continuous mining machines.

Electrical equipment can be either direct current or alternating current.

YEARS OF EXPERIENCE with all kinds of mining conditions have given Jeffrey engineers the know-how to assist you in achieving low cost production, employing the Jeffrey proven line of mining machinery. For this help, write your nearest district office as listed, or write The Jeffrey Manufacturing Company, 912 North Fourth St., Columbus 16, Ohio.

Birmingham 5, Alabama
3012 Fourth Avenue, South
FAirfax 2-8516, 2-8517

Bluefield, West Virginia
1703 Jefferson Street
P. O. Box 731
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Denver 22, Colorado
Application Engineers, Inc.
2150 South Bellaire
SKyline 7-1283

Evansville 7, Indiana
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Harlan, Kentucky
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Phone: 400 and 401

Iron Mountain, Michigan
Service and Supply Division
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Phone: 2980

Pittsburgh 22, Pennsylvania
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Salt Lake City, Utah
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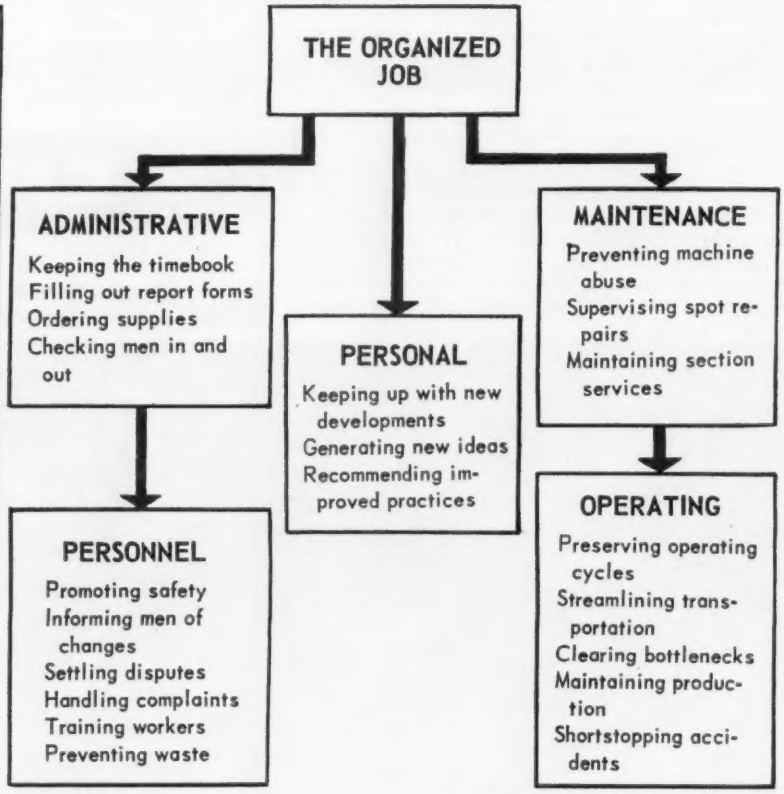
JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT...
TRANSMISSION MACHINERY...CONTRACT MANUFACTURING

Foremen's Forum

SUPERVISORY DUTIES

- Promoting safety
- Maintaining production
- Ordering supplies
- Preventing machine abuse
- Settling disputes
- Preserving operating cycles
- Supervising spot repairs
- Filling out report forms
- Keeping up with new developments
- Clearing bottlenecks
- Informing men of changes
- Checking men in and out
- Handling complaints
- Keeping the timebook
- Training workers
- Generating new ideas
- Shortstopping accidents
- Recommending improved practices
- Maintaining section services
- Preventing waste
- Streamlining transportation



LIST your supervisory duties, as shown at left above, then design a job breakdown, above right, by classifying duties under major phases of your job. As explained on p 122, we think this will help make your own job smoother and yourself more productive.

The Next Big Step

Automation of coal production and coal handling is the next big step in the continuous process of mechanizing the industry. We are engaged in taking that step. Here's how we think it affects you and your job.

AUTOMATION is a natural extension of the process of coal-mine mechanization that began with the introduction of the air-powered coal puncher. However, it is one step that may set up louder repercussions than any of the others, including the big switch from conventional to continuous face operations. Its effects are more deeply felt in the total community as a result of the labor economies that come with automation. "Where is everybody?" is the personal reaction of this veteran mine visitor when he now approaches the surface operations of one of our new modern properties.

This is one of the effects of automation that management, including supervisors, will have to be aware of and concerned about. It is our opinion that well-planned programs for the enticement of new industries into coal-mining regions are worthy of the sincere support and financial backing of concerned citizens of those regions, if only to preserve the investment in schools, churches and other municipal developments. And that investment includes as much heart as it does money.

No doubt the well-developed trend toward building power plants at the pit mouth will lure the new industries in time, but that is small comfort right now to the willing and able man who has been replaced by a selsyn motor. Do not fail to support your regional development programs. The problem is personally yours, if you like where you live.

However, the primary burden of this piece is to discern and discuss the ways in which automation affects you and your job. It does change things.

What to look for in a rail bond—

Easy installation. The USS Tigerweld BF-10 is positioned on the rail base by hammering and will cling to the rail without clamping devices for easy welding.

Versatility. You can install the terminal upside down with the strand under the rail base for maximum protection against derailments or right side up for easy inspection. All welding is done on top.

Low cost. The BF-10 can be reclaimed and used again by cracking the weld with a hammer and chisel. The steel terminals are ruggedly made and butt-welded to the strand for a reliable, low-resistance connection.

There's a USS Tigerweld Rail Bond for every conceivable mining application. All are built to take abuse . . . to help you maintain continuous electric service. Write for our book, "Tigerweld Power Bonds," American Steel & Wire, Dept. 0343, 614 Superior Ave., N.W., Cleveland 13, Ohio.

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More "Experts" On the Premises

Automation requires heavy investment in complex machines and tools for mining, cleaning and transporting coal and in control elements to govern their operation. The amount of this investment is so great and the margin in coal sales is so slim that lost motion or wasted time cannot be tolerated. Production methods, maintenance and services for the entire operation must be carefully planned, constantly studied and revised as needed. This work requires the full-time attention of specialists.

This is why today's big mines employ industrial engineers, ventilation specialists, maintenance engineers and so on. It is corollary to automation—the more complex the system, the more skill required to operate it successfully.

It's a matter of history that many foremen suspect experts of nefarious intentions. This goes back to the day when the first time-study man walked onto the section with stopwatch, notebook and no explanation for the foreman. However, any resentment of today's experts is ill-founded. They are contributors of vital effort to the total production process. Foremen must understand this and believe it. Full cooperation among foremen and staff experts is necessary to achieve the full potential of equipment and methods.

The solution here is the development of optimum communications between line and staff and the unfailing use of these channels of communication by line and staff officials. Top operating management must take the initiative in developing the procedures through which this intercourse may take place.

Does Automation Adversely Affect Safety?

Some say automation adversely affects safety, some say it doesn't and some say it can if adequate precautions are not observed. Time and the process of mechanizing have wrought tremendous changes in the way work is done at coal mines. Consider how it was in hand-loading systems when personal responsibility for safety consisted of making sure others were not in the way when a pick was swung. The situation became more severe when the man traded the pick for a loading machine with its lethal swinging components. Now in many instances we have widgets and thingumbobs controlling the actions of heavy machines.

Just as the man at the loading-machine controls had to be intelligent and dexterous to produce coal in safety for himself and others, the men who design and maintain automatic control systems must be men of superior technical abilities. The men who operate this equipment must be alert and keen.

The truth is that the coming of mechanized mining with all its ramifications has been accompanied by a steady decrease in the annual fatality lists from the nation's coal mines. Reduced man-hours of exposure, increased frequency of inspection, improved ventilation all have their roots in the mechanizing process accompanied by the union's fight for its share of the proceeds.

The further truth is that automation can be applied in a manner that will not disturb this desirable trend. It can, if every threat to safety that appears in the automatic equipment or processes is pounced upon and eliminated by all the forces that have been active in these matters in the past—research, inspection, engineering and agitation for improvement.

The foreman is a key figure in this picture, and he may find his role changing somewhat. Programmed processes and automatic devices will have increasing control over where and when work will be done. The foreman will be increasingly concerned with why the work is to be done and how his men will do it. The prospect is that he may have more time and will be under greater pressure to give more attention to safety. The automated mine or plant may well be the safer place to work.

Your Personal Approach

The illustration on the preceding page of this article represents a personal exercise in personal development. Only you can do it for yourself in your own job. The list at the left of the illustration is a list of the duties you may be called upon to perform with responsibility and accountability. It's a forbidding list. The diagram at the right is our attempt to organize these duties into various major phases of your total job. The diagram is a lot more digestible.

Sit down with pencil and paper and list all the duties you are supposed to perform, one after another—after another. Make the list as long as you must until you can think of no more responsibilities. Next, take each item from the list and thoughfully insert into a diagram like ours in the box where you think it most logically belongs.

As you apply this your job will take on more form and substance, it will make more sense, it will actually become less hectic. This is merely personal job organization. It can be a very great help to a mine supervisor at a time when his job specifications may be changing rapidly.

The final note is to keep up to date. Read, observe and listen with comprehension because new, important developments that affect you and your job are taking place every day.

The Campaign Enters The Final Quarter

THE 1960 NATIONAL CAMPAIGN to prevent injuries from falls of roof in coal mines is entering a final phase during which every supervisor and workman should resolve now to "play it safe," in handling mine roof. The object is to indefinitely postpone the next roof-fall accident at each mine and in each section. The ways and means of preventing roof falls are well known—the need is for constant application of these well-known methods, including frequent testing and following the approved roof support patern with extra support as needed.

Half-hearted testing is worse than useless because it may contribute to a false sense of security. The man, or supervisor, who tests the roof should look at the roof for telltale cracks or openings, listen to the roof when it is struck by the testing tool to detect any drumminess and feel the roof with his free hand to sense ominous vibrations. Anything less than this is not a good test. Do it every time.

The national campaign has real meaning for everyone who enters a coal mine. It is a worthwhile effort to eliminate distress among accident victims, their loved ones and their fellow-workers. It merits sincere support.

We are hopeful that the combined efforts of everyone at your mine will result in a commendable record for the year.

This Lima Type 1250 equals output of more expensive competitive shovel at W. Va. mine site.

Lima outperforms

says Paul Carapellotti, Mgr.
Huberta Coal Co., Steubenville, Ohio

"We tested our first Lima by working it next to a competitive machine. The Lima proved superior. It did more work with less maintenance. We now own five Limas—a 1201, two 2400's, a 1250 and a recently purchased 802 Lima Coal Loader with 3-yd. dipper.

"The 1250 is small enough to be very mobile; big enough to handle its own stripping and loading as dragline or shovel. It does as much work as a heavier rated competitive rig costing considerably more."—*Paul Carapellotti, Mgr., Huberta Coal Co., Steubenville, Ohio.*

Lima's are better built and better engineered for dependable high production, trouble-free operation. They are favored by mine operators because they outdig, outstrip and outlast other makes.

There's a Lima type and size for every mining job. Shovels to 8 yd., draglines variable; choice of gasoline, Diesel or electric power; crawler, truck or wagon mounting. Ask for facts. See your nearby Lima distributor. Or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

LIMA Construction Equipment Division, Lima, Ohio

BALDWIN · LIMA · HAMILTON

6012

Shovels • Cranes • Draglines • Pullshovels • Roadpackers • Crushing, Screening and Washing Equipment

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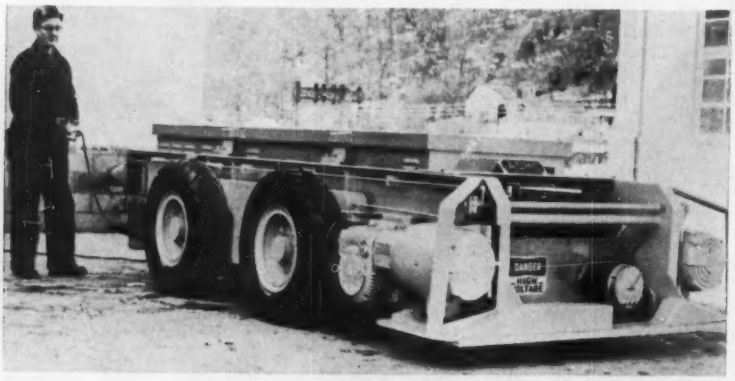
Operating Ideas



Special Carrier Simplifies Underground Transformer Moves

A SPECIAL self-propelled carrier makes possible fast and easy transportation of underground power transformers at mines of the Island Creek Coal Co., Holden, W. Va.

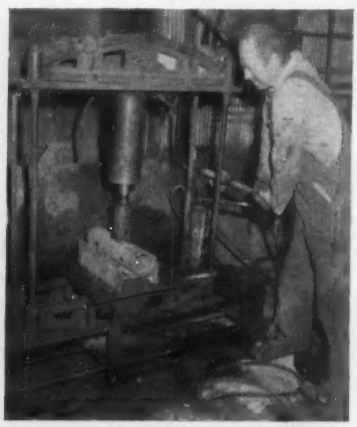
Designed and built in two sizes to Island Creek specifications by the Acme Machinery Co., the carrier is used to transport 300- and 500-kva transformers. Island Creek became interested in developing the carrier when AC face equipment was purchased for its Guyan mines and the AC power system extended to the sections. The AC power setup required that the skid-mounted substation be moved ahead after a 500-ft advance of the working faces. Before the carriers went into service, pulling the skid-mounted transformer 500 ft was time consuming. Now a substation move can be made in a matter of minutes.

Mounted on four 7:50x15 12-ply tires, the carrier has two 10-hp tramming motors, disk brakes and a flat bed. A unit designed to haul a 300-kva transformer is 11 ft 6 in long and one designed for a 500-kva transformer is 13 ft 8 in long.

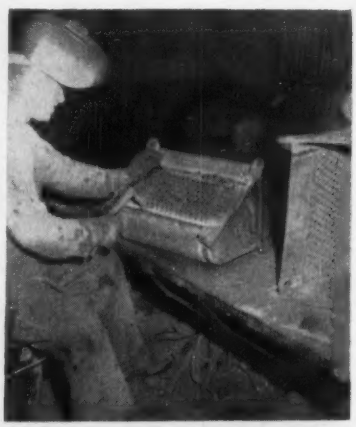
One man walks beside the carrier and controls tramming and steering with a remote control that he holds in his hands. Linked to the carrier by a short cable, the control enables him to watch all points of the carrier and transformer during moves.

The carrier is 74 in wide, has a maximum height of 40 in for a 500-kva transformer and 35 in for a 300-kva transformer.

Step 1—Mechanic cuts section from scrap ¼-in punched plate screen.



Step 2—He uses hydraulic press to shape it to fit bottom of elevator bucket.



Step 3—Curved repair section is welded to outside of elevator bucket.

Scrap Screen Repairs Dewatering Buckets

PIECES of scrap ¼-in punched-plate dewatering screen are helping to reduce the cost of maintaining buckets on the refuse-dewatering elevator at the Truax-Traer Coal Co., Little Sister Mine, St. David, Ill.

A shop mechanic cuts a 6x16-in section from a scrap screen, grinds off the rough edges, shapes it with the aid of a hydraulic press and then welds it over the worn area of the bucket. To shape the screen the mechanic places it on a curved base made up of a segment of 8-in pipe welded to a short piece of I-beam. He then places a piece of 4-in pipe on top of it and uses a Beco hydraulic press to shape the screen to the desired conformation.

It takes a repairman about 3 hr to make a new curved bottom and weld it to the worn bucket. The scrap screen is also used to build up any worn bucket lips or back sections to further enhance the economy of the operation.

Only BOSTRON V-Belts

are made with...

BOSTRON Tensile Members PLUS NEOPRENE with FIBER-DISPERSED Stock

GREATER STABILITY — Changes in humidity — and the resulting moisture regain — often mean a matching problem with ordinary V-Belts. The moisture regain of BOSTRON is low — 0.4% — or 1/20th that of the conventional reinforcing fiber. This means far less time spent in matching, and lower belt inventory too.

HIGHER STRENGTH — Stronger belts can withstand more shock loading, need less maintenance. BOSTRON is approximately 40% stronger than the conventional fiber used in V-Belts.

STRETCH RESISTANCE — V-Belts reinforced with BOSTRON have low stretch. BOSTRON is inherently stretch-resistant and the cords are put through a special heat and tensioning process to further minimize stretch. Thus, belts reinforced with BOSTRON show comparatively little growth — even after many months of continued operation.

GREATER RESISTANCE to oils, heat, abrasion, chemicals and ozone is provided by Neoprene.

HIGH CROSS-WISE RIGIDITY is provided by the closely-packed, straight-line formation of the fibers in the compression member.

EXCEPTIONAL LENGTH-WISE FLEXIBILITY is provided by the virtually frictionless positioning of fibers.

EXTRA SUPPORT for the tensile members during shock-load impact and during normal operation.

The industry's most advanced developments are now standard in the entire BOSTON Multiple V-Belt line!

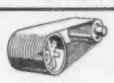
● CUT DOWN MAINTENANCE ● MAINTAIN SMALLER INVENTORY ● SAVE MATCHING TIME ● SAVE TAKE-UP TIME

BOSTON

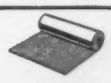
BOSTON WOVEN HOSE & RUBBER COMPANY
DIV. OF AMERICAN BILTRITE RUBBER CO., INC.
BOSTON 3, MASS.

INDUSTRIAL HOSE

BELTING


V-BELTS

PACKING


MATTING

TAPE

Operating Ideas (Continued)

Dolly Eases Truck-Tire Changes

CHANGING TIRES on big coal haulers is simplified with the aid of a shop-built dolly in service at the Truax-Traer Coal Co., Little Sister Mine, St. David, Ill. With the aid of the dolly, one man can change a tire with little physical effort. It formerly took two or three men to do the same job and required considerably more physical effort.

Mounted on four 4-in casters, the dolly has a rack and chain for securing either single or dual trailer tires. It also is fitted with two removable brackets which make it possible to handle the smaller tires on the front end of the tractor.

Portable Magnet Cuts Tire Damage

A SHOP-MADE PORTABLE MAGNET helps reduce tire damage at the Truax-Traer Coal Co., Fiatt, Ill., by picking up nails, bolts, nuts, ends of welding rods or pieces of wire rope which frequently are dropped on pit roads. Pulled by a farm tractor, the portable magnet is energized by a 115-V 17.5-amp generator driven by a Clinton 9.6-hp air-cooled gasoline engine.

The magnet, measuring 18x48 in, is mounted on a frame made from 4-in channels. Mounted on two 6:50x16 wheels, the frame also has a tow bar for connecting the unit to a tractor.

When the operator wants to release the metal picked up by the magnet, he stops the tractor at a convenient spot and pulls a cutout switch that interrupts the flow of current to the magnet and thus deenergizes it. The cutout switch makes it possible to discharge the metal from the magnet without stopping the gasoline engine.

Old Dragline Chain Tows Big Trucks

PIECES of old dragline chain attached to the bumpers of semitrailers serve as tow chains and prevent damage to the semitrailers at the Truax-Traer Coal Co., Little Sister Mine, St. David, Ill. Furthermore, breakage of shop chains which were frequently used for towing big semitrailers is now eliminated, mine management notes. Each of the coal haulers has a husky hook on the front bumper so that the unit can be connected to the tow chain of another truck and towed to the shop in event of a breakdown.

Only Spencer uses military type underwater tests to determine the relative effectiveness of commercial explosives. These tests are the latest in a continuing research program conducted by Spencer Chemical Company, the pioneer supplier of solid ammonium nitrate as an ingredient in blasting.

Precise new underwater testing method shows . . .

Spencer N-IV And Fuel Oil Produces Up To 7 Times As Much Useful Energy Per Dollar

. . . when compared with gelatin dynamites

How do you measure the true blasting effectiveness of commercial explosives? Unsatisfied with present methods, Spencer Chemical Company and a well known research organization teamed up to discover a better way.

After extensive investigation Spencer adopted underwater testing methods developed through military research. These were found to provide data better related to commercial blasting than any other testing method. As a result, more accurate standards of evaluating the actual useful output of explosives have been developed.

Latest test results show that Spencer N-IV Ammonium Nitrate and fuel oil deliver up to seven times as much useful energy per dollar as gelatin dynamites (see chart at right).

Extensive research has also shown that Spencer N-IV, when mixed with the recommended 6% fuel oil, delivers 20% to 25% more blast energy than equal charges of other solid ammonium nitrate-fuel oil mixtures. There are two main reasons for this: (1) lower density which provides greater ease of detonation, (2) special prill structure which allows fuel oil to be absorbed more evenly.

It costs you nothing to get the full benefits of Spencer's advanced knowledge and experience in this field. Just mail this coupon. No obligation of course.

PERFORMANCE COMPARISON OF BLASTING MATERIALS

Explosive	Heaving Energy Ft. Tons/Lb.	Shattering Energy Ft. Tons/Lb.	Effective Energy Ft. Tons/Lb.	Useful Energy Ft. Tons/$
Spencer N-IV and Fuel Oil	423	60	483	14,230
40% Gelatin Dynamite	257	115	432	1,770
60% Gelatin Dynamite	384	84	372	1,800

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Without cost or obligation, please send me the latest information on the use of Spencer N-IV and fuel oil for blasting.

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Equipment Developments

Walking Dragline Has Extended Range

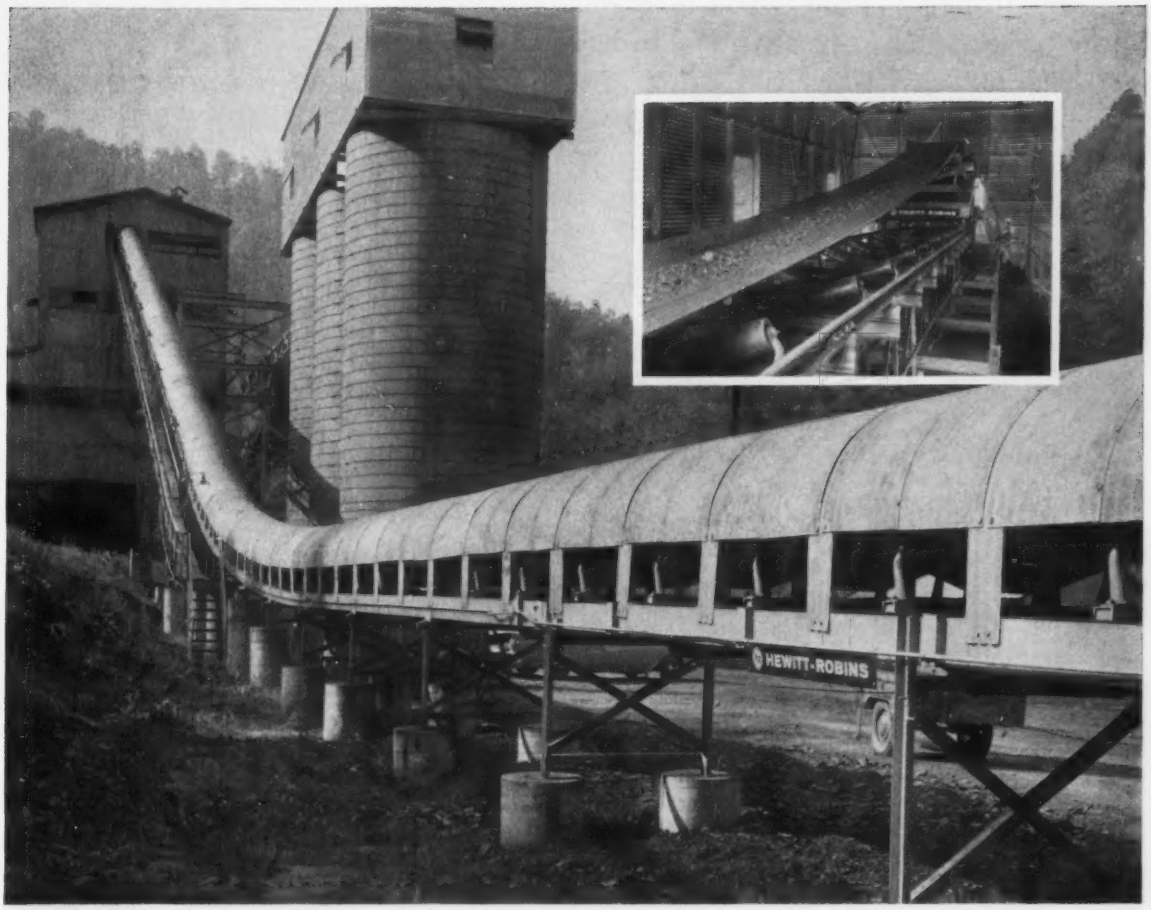
Major new design features enable the new Model 1250-W, made by Bucyrus-Erie Co., South Milwaukee, Wis., to handle larger capacities at greater boom lengths. Largest B-E machine of its type, the full-electric unit has a unique boom design (photo) which, according to the company, permits the use of boom lengths previously considered impractical. The machine above is owned and operated by All State Equipment Co., Pittston, Pa. Seen stripping overburden to depths of 130 ft, it has a 22 ft boom and 35-cu yd heavy-duty Beco dragline bucket. The 1250-W is one of 12 models of walking draglines offered by Bucyrus to the mining and general excavating industries.

High-Explosive Primers

Three compact easy-to-handle primers for initiation of low-grade ammonium nitrates and other blasting agents have been announced by Austin Powder Co., Cleveland. Color-coded as Austin Red Cap, Blue Cap and Black Cap, primers are said to be unaffected by water and insensitive to shock and abrasion, with rifle impact sensitivity of zero. Holes can therefore be loaded as soon as drilled when primers are used with detonating fuse. If incomplete detonation of a blast occurs, primers can be more safely dug out, notes the firm. The primers have a speed of more than 22,000 fps. Red Cap and Black Cap are reportedly equivalent to regular 30-lb dynamite primers, although weighing only 13 oz apiece. They are designed for initiating a minimum of 300 lb of low-grade ammonium nitrate in large-diameter holes, while the 8-oz Blue Cap is for small-diameter holes. A central channel permits fast threading of detonating fuse through their entire length, and in deep holes additional primers can be quickly slipped on the fuse at desired intervals.

Hauler Has More Power

A 60-ton coal hauler with extra power to move up steep grades without speed loss is a product of The KW-Dart Truck Co., Kansas City, Mo. The hauler, Model 60SBDT, gets its power from a 450-hp diesel engine, and has a four-speed transmission, single-stage torque converter and torqmatic brake for retarding the vehicle on downhill runs. Sheathed with steel plate, the trailer has a minimum of exposed framework. Hopper doors open instantly by an air release control in the cab. KW-Dart, which also makes coal haulers of 50- and 70-ton capacity, declares that properly distributed weight and a low center of gravity assure superior stability and top-notch road ability.



Tonnage! H-R Sectional Conveyor and C/R Belt Deliver 350 TPH!

At Whitewood, Va., Jewell Smokeless Coal Co. uses an economical Hewitt-Robins sectional conveyor and a standard Ajax C/R belt to carry 350 tons of coal and rock an hour from mine to preparation plant. Built around high-tenacity rayon, this sturdy belt provides:

- Greater strength
- More elasticity
- Increased heat and humidity resistance
- More economy
- Longer service life

The quality and dependability you'll find in Hewitt-Robins conveyors and belting are built into all H-R industrial hose and materials handling equipment. For full details consult your H-R representative, or write Hewitt-Robins, Stamford, Connecticut. Ask for Bulletin 10-49

HR HEWITT-ROBINS

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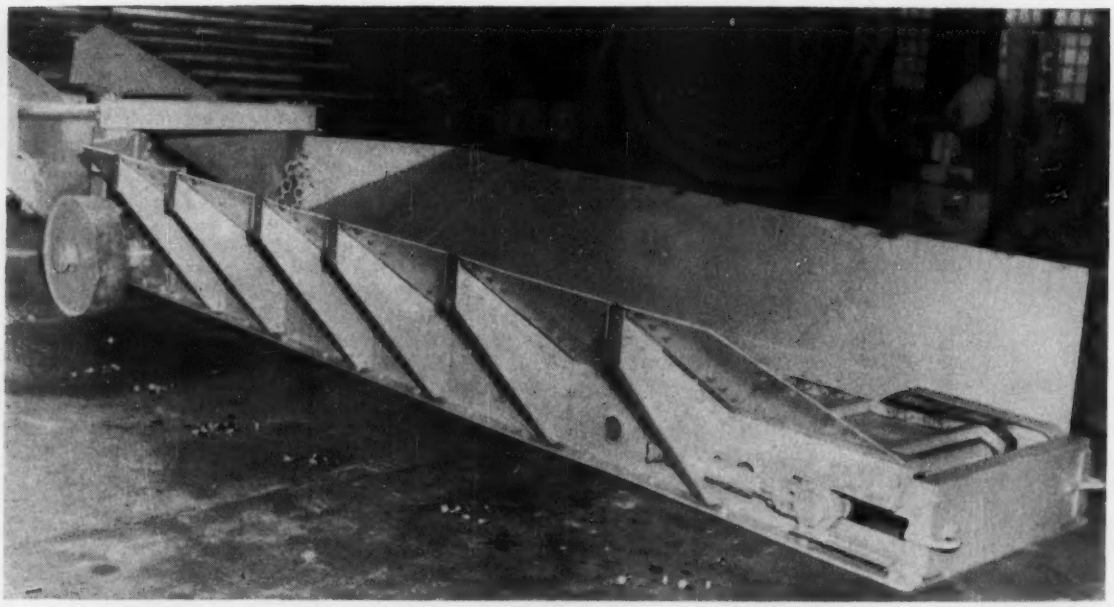
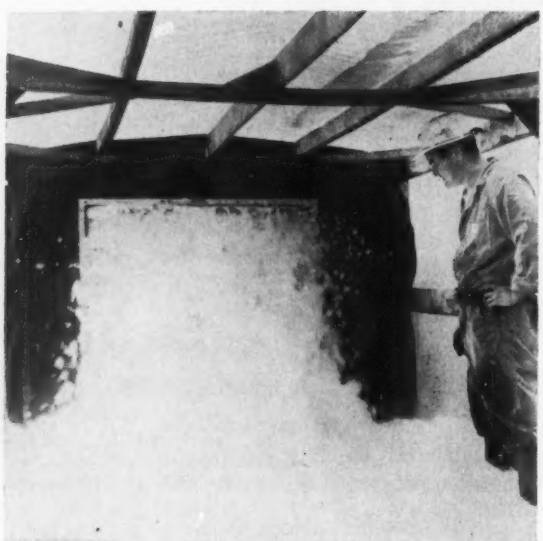


More Efficient Belt Feeder

A new belt feeder featuring mechanical simplicity, flexibility in ratio and ease of movement, provides what manufacturer Jamison Feeder, Inc., Hunkers, Pa., terms "Positive Performance." The new cost-cutting feeder is available for use in thin- as well as thick-seam mining. The basic unit is 20 in high with a moving height of 27 in. It will receive a 4-ton load in as little as 15 sec and discharge onto the belt at any desired rate, according to the company. The belt feeder is 25 ft long and 7½ ft wide, easily moved and quickly set up. With the proper vertical side extensions, the unit will handle the highest-tonnage shuttle cars that are now available, offering ratios up to 20 to 1, notes Jamison. Key advantages the company cites are substantial increase in efficiency of any belt and a great reduction in belt maintenance costs.



Bubble Gun-Like Device Puts Out Mine Fires

In a matter of minutes, oceans of foam tumble out of a new device made by Safety Development Corp., Greensburg, Pa., and go to work snuffing out mine fires. The equipment, consisting of a portable foam generator equipped with pleated nylon netting, nozzles and other accessories, can generate 12,000 cu ft of foam per minute, driving it 2,000 ft from the mouth of the machine. In operation, a proportioning pump assembly mixes a special foaming agent with water. Rapid generation of high expansion foam having 1,000 times the volume of the liquid follows, in contrast to conventional fire fighting equipment with its 10 to 1 expansion ratio, says the firm. The bubbling mass, when driven into the fire area, acts as a plug, filling every air space and starving the flames for oxygen. Conversion of the bubbles to water and then to steam absorbs much of the heat of the blaze, creating a cooling action which prevents re-combustion and eliminates the hazards of gaseous explosions, according to Safety Development.

New Diesel For Trucks

The engine which the two gentlemen in the photo are admiring is the new Model 1673, Caterpillar Tractor Co.'s first engine entry in the trucking field. Caterpillar, Peoria, Ill., notes that in the 1673 it is offering the trucking industry a trouble-free fuel system, compact four-cycle design and mechanical excellence. The unit, a six-cylinder turbocharged engine, provides 220 hp at 2,200 rpm. In the 1900 to 2,100 rpm range, says Caterpillar, the 1673 uses only .398 lb of fuel per brake hp-hr, a very economical rate in truck engines, according to the firm. Feature of the new engine is a precombustion chamber design. The chamber, which assures complete burning results at all load conditions, including idling, makes it possible for the company to use a fuel injector with a large single

HOW TO MAINTAIN GAGE AND SPREAD AT THE HEEL ENDS OF SWITCHES

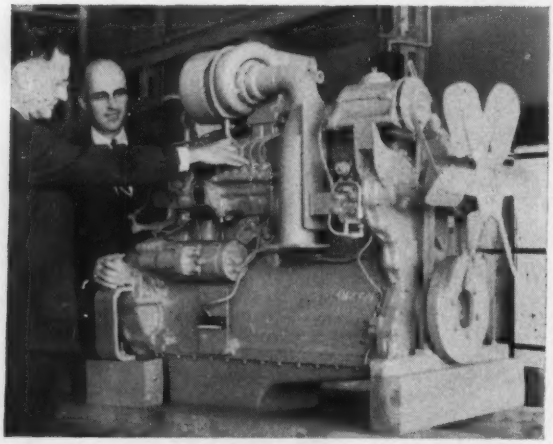
There's really no trick to it, if you equip your turnouts with Bethlehem's Design 992 Switch Heel Block.

Fitting snugly between the stock rail and the closure rail and switch point, this sturdy device was designed especially to maintain track gage and heel spread at the heel end of a mine-track switch. Bushings welded to one side of the block permit you to draw bolts up tightly without in any way limiting normal movement of the point. At the same time, the Design 992 keeps closure rail and switch point in correct alignment, both vertically and horizontally.

You can get the Design 992 Switch Heel Block to fit any length of switch or weight of rail, from 40 lb per yd on up. Your own men can install this efficient device quickly, and the operating results will be gratifying. Let one of our engineers demonstrate the value of Bethlehem Switch Heel Blocks for your haulage system.

BETHLEHEM STEEL

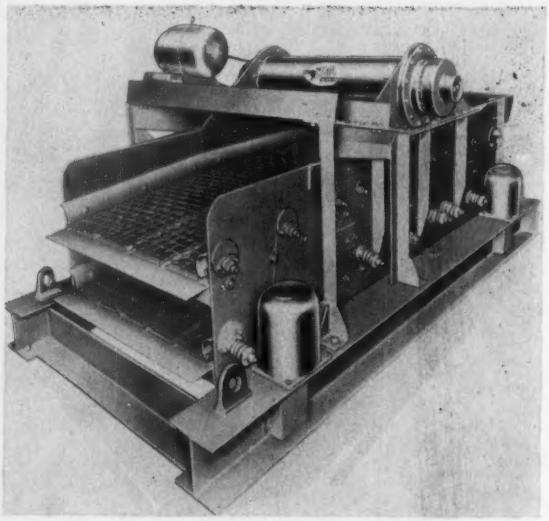
BETHLEHEM STEEL COMPANY, Bethlehem, Pa. EXPORT DISTRIBUTOR: Bethlehem Steel Export Corporation



orifice. This eliminates fouling problems in the orifice and greatly reduces the amount of maintenance usually required on truck diesels, declares the company.

Improved Suspension

Deister Machine Co., Fort Wayne 4, Ind., has announced an improved enclosed spring- and rubber-mount suspension system for Deister vibrating screens. Far greater stability is claimed for this new suspension, which incorporates a heavy welded H-beam base. This integral base provides a substantial increase in solid or "dead" weight as compared to "vibrating weight,"



according to the firm. The "dead" weight ratio in the Deister Type UHS with the new enclosed spring and rubber mount, for example, is now 1 to 2 versus 1 to 7 or more in most screens, declares Deister. In the system, only four mounts are used, one at each corner, in contrast to the old system which had a row of heavy steel springs between the angle iron base and the bottom edge of the side plates. The new Deister screens are especially suitable for cable suspension and may be installed without additional costs, it is added. According to the

Here you are viewing a CRYDERMAN Shaft Mucker

operating in a flat slope with a 20' x 10' rock section. From vertical to flat slope the Cryderman operates with ease.

Being able to muck out the full round even to the clean up is outstanding, in addition this mucker is used for scaling roof and walls and raising and placing heavy support timber.

Why not arrange to see this revoluntionary slope mucker in action and learn first hand the great potential of the most versatile shaft mucker in the field.

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FIRESTONES PULL HAUL COSTS DOWN!

Take a tip from nationwide construction records—Firestones lower tire costs per job! Here's why: Firestone off-the-highway tire dependability plus Firestone's Giant Tire Service keeps expensive equipment on the job and *working*. Firestones are built with Firestone Rubber-X, the longest-wearing rubber ever used in Firestone tires. Firestone Shock-Fortified nylon cord is a natural for off-highway loads—holds impact damage to the minimum. And your Firestone Tire Expert will help you match tires to the job as well as handle all maintenance problems. Turn downtime into worktime with Firestone tires and service! Call your Firestone Dealer or Store today.

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TUBELESS OR TUBED

Super Rock Grip Wide Base* Super Rock Grip Deep Tread*

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BETTER RUBBER FROM START TO FINISH

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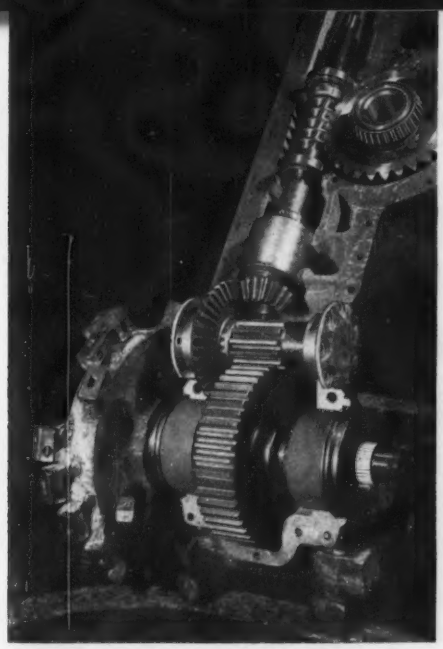
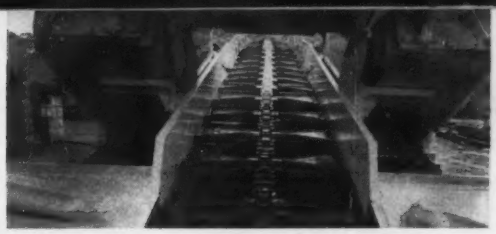
*Firestone T.M.

USS "T-1" Steel throat swallows

New Lee-Norse CM-38 Continuous Mining Machine mines up to 75-90 tons of coal per man shift.



Gearbox for one of two cutter heads is packed with high quality rugged alloy steel gears.



Looking down the "throat" of the 32-foot miner. USS "T-1" Steel was used in the conveyor base plates because of its high resistance to impact abrasion.

Crawler wear plates (black bars stacked in foreground against machine) are made of USS "T-1" Steel for maximum life. They go between the treads and the tread frame.

150,000 tons of coal a year

This mining machine in action looks like a greedy dragon at the mine face, stuffing its mouth with coal at the rate of about 150,000 tons a year.

The material selected for the conveyor "throat" was USS "T-1" Steel. The designers, Lee-Norse Company, wanted a steel that would stand up under the grinding action of the coal for at least 200,000 tons. So far, USS "T-1" has more than met their expectations . . . not only in the conveyor deck plates but also in the crawler wear plates.

The reasons for the long life of "T-1" Steel are its high resistance to impact abrasion, plus great strength and toughness. In other applications, such as shovel teeth and lips, chutes and vibrating screens, "T-1" Steel has outlasted other metals up to five times! This means substantial reductions in maintenance costs and the big machines stay on the job longer.

USS CARILLOY Steel gearing

A machine with a job like this must be built to take abuse. And to obtain ruggedness and reliability, Lee-Norse engineers used USS Alloy Steels for many gears in the cutter drive, conveyor drive, crawler drive and gathering head drive. Most of these were Ni-Cr, Ni-Mo, or Ni-Cr-Mo alloys for strength, hardness and toughness.

For more information on any of these top-quality steels, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

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This mark tells you a product is made of modern, dependable Steel.

United States Steel Corporation—Pittsburgh
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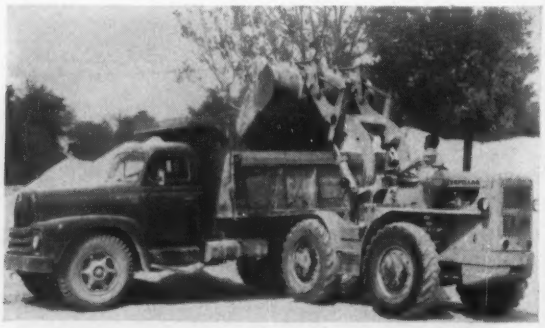
United States Steel

manufacturer, the effectiveness of the new spring and rubber mounts and the heavy rigid base preventing whip and vibration eliminate the need for additional springs where cable-mounting is employed.



New Earthmover

Model 922, an 80-hp machine, is the third in a line of wheel Traxcavators recently introduced by Caterpillar Tractor Co., Peoria, Ill. In overall design and configuration, the 922 closely resembles two larger machines previously announced, the 105-hp Model 944 and the 140-hp Model 966. The 922 has a 1¼-cu yd capacity bucket and is powered by either a gasoline or diesel engine. A prime feature is the open and easily accessible operator's compartment and the location of loader mechanism completely ahead of the operator's compartment. With maximum lift capability of 12 ft 2 in and a dumping reach of 25¾ in, the machine has a breakout force of 13,700 lb. Turning radius at the outside rear tire is 20 ft 4 in. Ground clearance is 14⅝ in. Power train of the 922 includes a two-speed power-shift transmission, a torque converter, auxiliary transmission and a planetary final drive.

Lightweight Trailer

Galion Allsteel Body Co., Galion, Ohio, is marketing the

FARRELL-CHEEK
ALLOY CAST STEEL MINE CAR WHEELS AND HIGH PERFORMANCE PARTS

MADE OF F85 ALLOY CAST STEEL

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Far from ordinary, these highly specialized mine car wheels, electric furnace cast of F85 alloy steel, are establishing new performance and service life records in actual use. A Brinell of 350-400 is provided on treads and flanges with a high degree of ductile toughness in hubs and webs.

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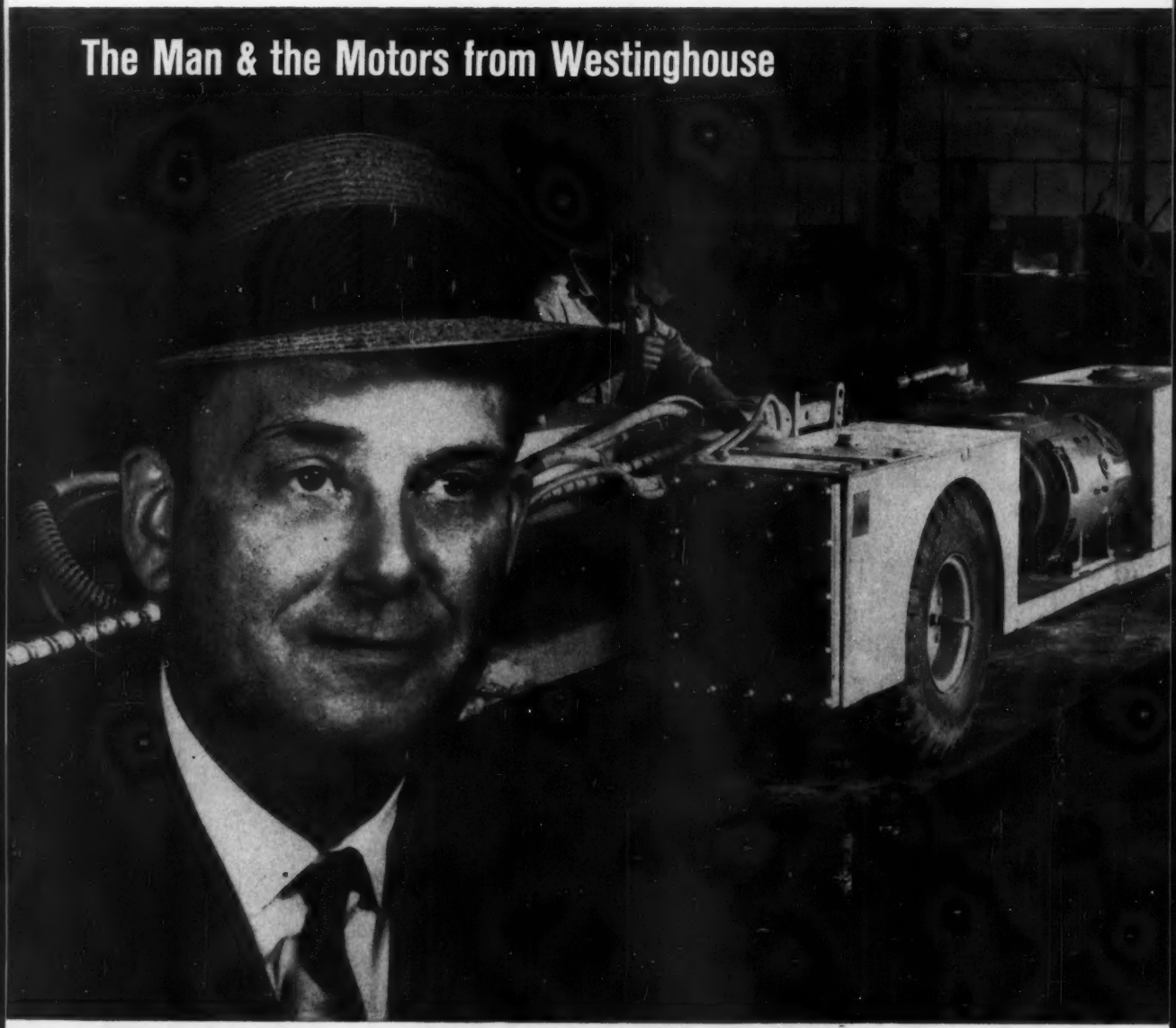

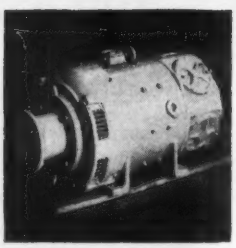

Mr. Westinghouse* matches the extraordinary Long-Airdox mobile coal drilling machine with the industry's most dependable motor

"True, built-in, explosion-proof protection, long-term service and minimum maintenance" are compelling reasons for trusting the machine's power supply to Westinghouse d-c motors. These motors drive hydraulic pumps which actuate hydraulic motors, in turn operating tramming and drilling functions.

The Long-Airdox TDF-10 brings unique mobility to thin seam mines, produces a 9-foot hole in 20 seconds, enables one man to perform both drilling and shooting. Mr. Robert Nelson, vice president, states that the Westinghouse motors, upon which much of the performance of the TDF-10 relies, have established an impressive record in the face of one of the industry's most demanding chores.

You can be sure . . . if it's Westinghouse.

**Irv Rowe, Charleston, West Virginia, Sales Office*

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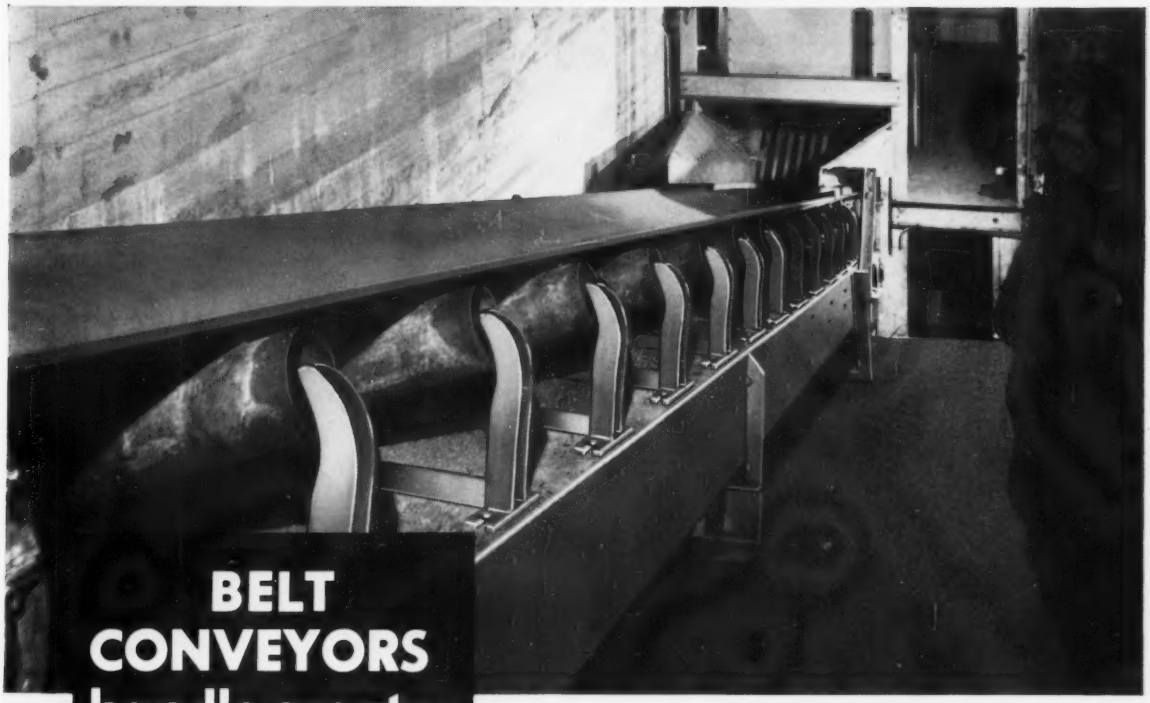
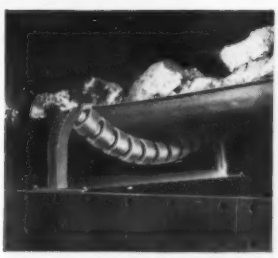


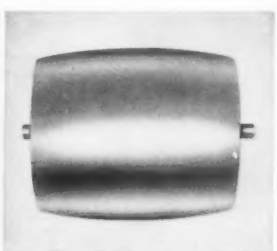
BELT CONVEYORS handle greater coal tonnage at lower cost per ton

Speed, efficiency and lower cost per ton in handling raw coal are prime factors of evaluation when considering a belt conveyor system. Feature for feature, STEPHENS-ADAMSON belt conveyors meet and surpass these major requirements. Enviable records of greater tonnages handled at a lower cost per ton are turned in daily by countless S-A belt conveyor systems now in operation all over the world. Write today for full details on S-A Engineered Conveyor Products for coal handling.

S-A QUALITY ENGINEERED PRODUCTS FOR COAL HANDLING



S-A CATENARY CARRIERS — BULLETIN 260



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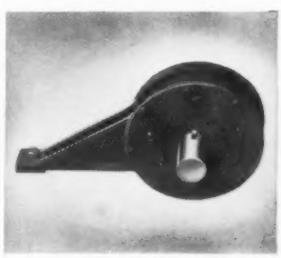

S-A HOLDBACKS BULLETIN 557

WRITE FOR BULLETIN 355

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ENGINEERING DIVISION

STEPHENS-ADAMSON MFG. CO.

GENERAL OFFICE & MAIN PLANT, 55 RIDGEWAY AVENUE, AURORA, ILLINOIS

PLANTS LOCATED IN: LOS ANGELES, CALIFORNIA • CLARKSDALE, MISSISSIPPI
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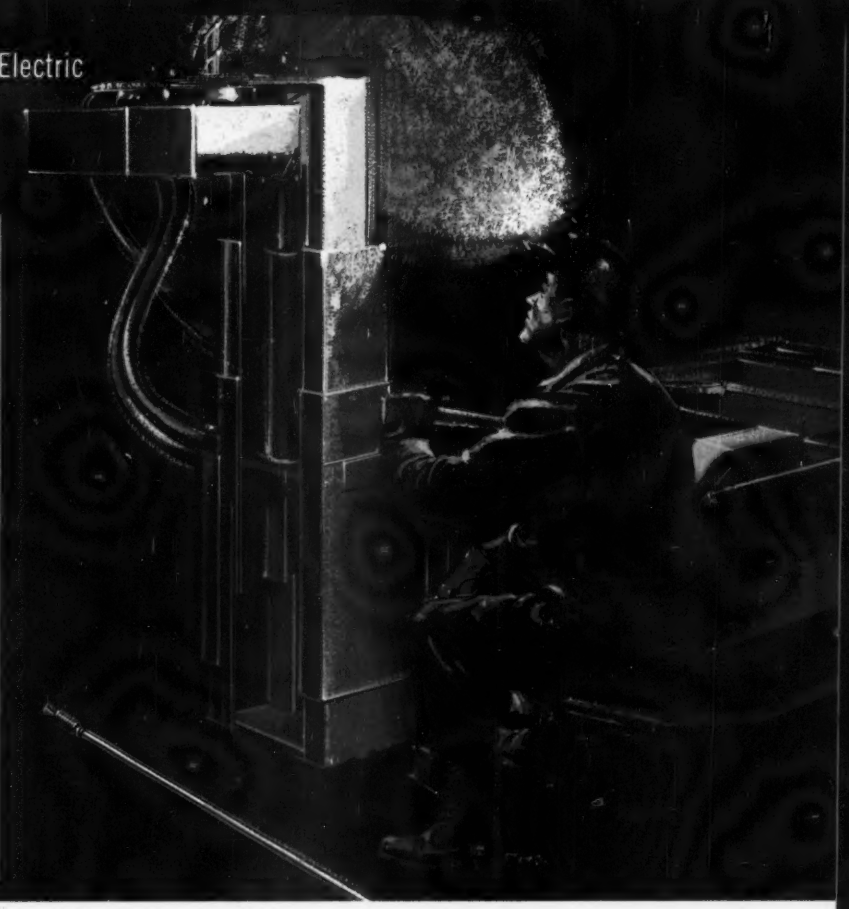
Metallurgical Memo from General Electric

- CARBOLOY® PTV STYLE BIT
- DRILLS MORE FOOTAGE BETWEEN GRINDS
- SHOCK RESISTANT
- SUPER FORGING DESIGN



Are you getting maximum footage from your drilling machines?

For fastest penetration in light drilling

specify APT

Higher speeds and feeds

Carboloy APT auger type roof-drilling bits provide top footage faster where easy-to-normal roof conditions exist. They deliver clean, straight, on-gage holes faster. Resist tip loss through high strength braze to heat-treated forged alloy steel shanks . . . good assurance against breakage.

Match their power with General Electric CARBOLOY® PTV roof bits!

Are the roof-drilling bits you are using piling up the peak footage your fast-penetrating, modern machines can deliver?

In the design of Carboloy PTV solid-insert type bits, Carboloy mining-tool engineers have taken full advantage of modern high power. They have developed a rugged, shock-resistant solid carbide for peak performance for all roof-bolting applications. Produced bits to get more footage and hold gage even after many regrinds. Engineered a strong forging which directs the free flow of cuttings away from the insert. Matched cutting action to machines to lower drilling costs.

Your nearest Carboloy Distributor, listed on the adjoining page, will "match" the proper bits to your machines. Call him or write: *Metallurgical Products Department of General Electric Company, 11415 E. 8 Mile Rd., Detroit 32, Michigan.*

CARBOLOY
CEMENTED CARBIDES

METALLURGICAL PRODUCTS DEPARTMENT

GENERAL ELECTRIC

CARBOLOY® CEMENTED CARBIDES • MAN-MADE DIAMONDS
MAGNETIC MATERIALS • THERMISTORS • THYRITE® • VACUUM-MELTED ALLOYS

Complete service through factory and distributor assistance

AUTHORIZED CARBOLOY MINING TOOL DISTRIBUTORS

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Birmingham 2—Shook & Fletcher Supply Company

COLORADO
Denver—The Mine & Smelter Supply Company

ILLINOIS
Mt. Vernon—Pickard Industries, Inc., Central Mine Supply Division

INDIANA
Terre Haute—The Mine Supply Company, Inc.

KENTUCKY
Harlan—Kentucky Mine Supply Co., Inc.
Hazard—Spock Cornett Supply, Inc.
Madisonville—Pickard Industries, Inc., Central Mine Supply Div.
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OREGON
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PENNSYLVANIA
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Washington—Fairmont Supply Company

TEXAS
El Paso—The Mine & Smelter Supply Co.

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Salt Lake City—The Mine & Smelter Supply Co.

VIRGINIA
Andover—Central Supply Co., of Va., Inc.
McClure—Erwin Supply Company

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Charleston—Rish Equipment Company
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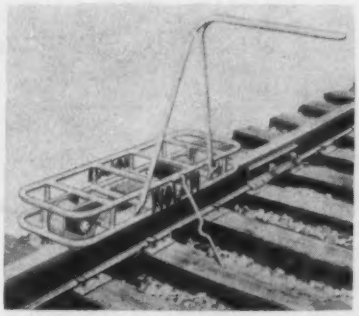
Fairmont—Fairmont Supply Company
Montgomery—Marathon Coal Bit Company, Inc.
Shinnston—Erwin Supply Company

Model XL dump trailer, which has 1-in "V" corrugations and is designed for maximum payload and lightest possible empty weight. Feature of the new design, says Galion, is the completely-boxed top roll section, which acts as a strong compression member and protects against side spreading at any stage of the dumping cycle. The bodies are built without weight-wasting longitudinals, notes Galion. Instead they have a 6x70-in stub longitudinal to hinge the body to the chassis. Units are designed for use with full frames to provide stability and maintain the desirable high-spill point for stock-piling and spreading operations since the base of the frame-type unit remains constant throughout the dumping operation. Model XL comes in lengths of 16 to 28 ft with a capacity range of 10 to 35 cu yd.

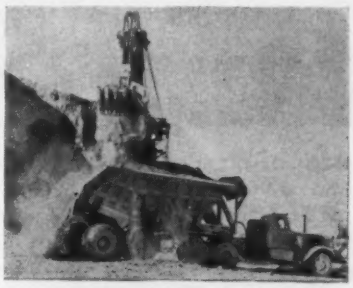


Mine Track Dolly

From The Nolan Co., Bowerston, Ohio, comes a many-purpose mine track dolly for fast, easy transportation of rails, ties, supplies and other equipment. This two-wheel track dolly is made of tubular high-carbon steel for sturdiness. The operator's handle is conveniently placed to assure correct balance and full control of heavy loads. A detachable handle permits carrying of the dolly when required. Wheels are cast steel, ball-bearing equipped for easy running. The deck is heavy mesh-expanded steel, and a spike holds the dolly in loading position. Lengths available are 50½ in and 36 in.

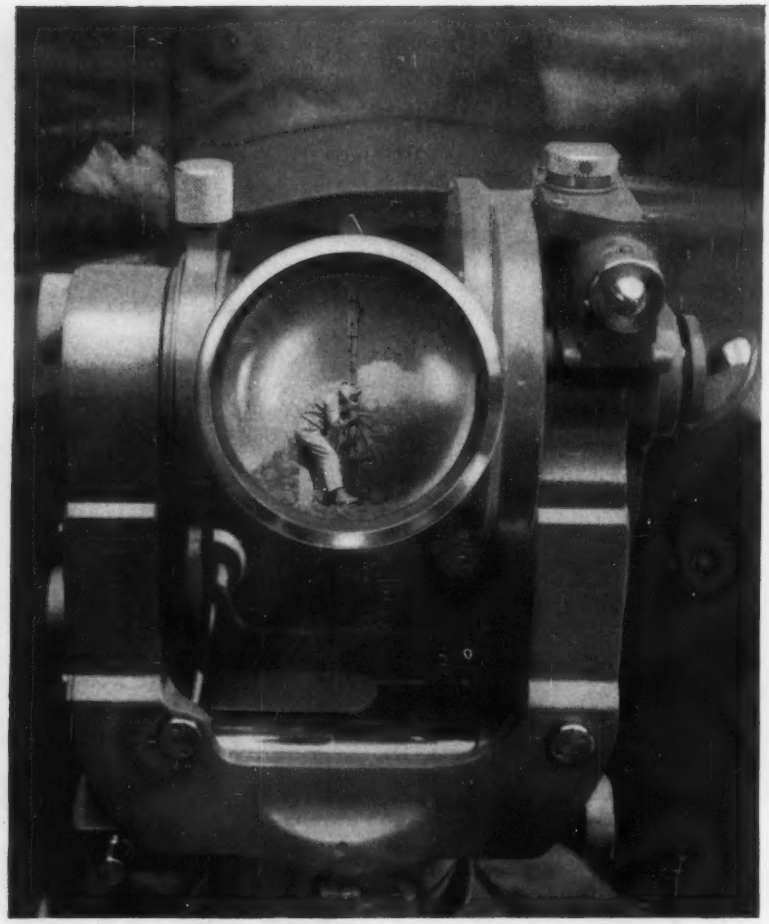
New Shovels

Addition of five new models to its line has been announced by Marion Power Shovel Co., Marion, Ohio. They range in crawler crane ratings from 30 to 75 tons and in shovel capacities from 1¼ to 1¾ cu yd. Many of their new features are pegged to improve and diversify machine usefulness as cranes, while others have significance for dragline, hoe and shovel users. Wide ranges of axle widths, crawler side frame lengths and crawler belt widths permit users to select combinations to meet a wide variety of flotation and lifting radii problems. Power load lowering, third drum, independent boomhoist, independent travel, torque converters and multiple speed transmissions are among the accessories available. Crane models include capacities of 30, 40, 50, 60 and 75 tons, with boom and jib maximum combinations from 115 to 200 ft. The models include drag and clamshell capacities to 2½ yd, hoe capacities to 2¼ yd and shovel capacities of 1¼, 1½ and 1¾ yd.



New Hauling, Dumping Equipment

The "Stabilift" end-dump semi-trailer (top) and the "Earthking" bottom-dump hauling unit (bottom) are products of Challenge-Cook Bros. The C-B Stabilift will work anywhere a dump truck can be used. This equipment is built in models up to 70-ton capacity which are especially built for quarry work. The Earthking is engineered for off-highway work and has a 45-ton payload capacity. It works with any type loading equipment,



RECOGNIZED THE WORLD OVER for highest accuracy, convenience, and unequaled precision throughout the instrument. MOST WIDELY USED for first and second order triangulation, and in industry and laboratories where extremely accurate angle measurements are required. Accessories are available for astronomical use.

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WILD T-3
PRECISION THEODOLITE
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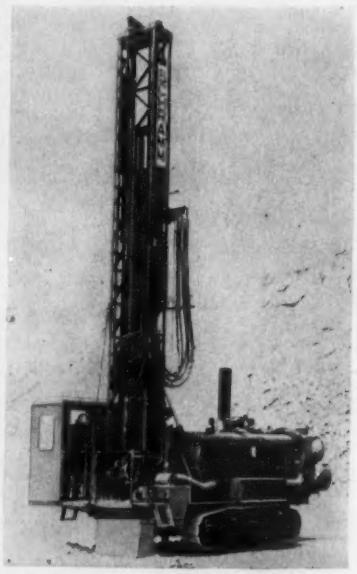
including shovels, clam shells, moving and stationary belt-type loader. It loads and unloads "on-the-move" and offers operators the fastest load-haul dump cycle of any equipment on the market.



New Drilling Rig

A self-contained blast hole drilling rig, Model C66, is a product of Schramm, Inc., West Chester, Pa. The machine mounts all equipment needed to drill holes to required depths in quarry and rock removal operations on a single self-propelled crawler. The rig, designed for one-man operation, has all controls in the cab. A separate air compressor is not needed because a 600-cfm unit is built in. A "Lazy Susan" rack mounted in the mast holds extra drill pipe ready to be swung under the drive sub and threaded as needed. The top drive rotation head gets power from variable speed hydraulic motors which can be adjusted to specific drilling conditions. Its design permits the C66 to be used for drag bit or tri-cone drilling, in addition to ax-bottom hole drilling with the Schramm Rotatool. With 28,000 lb of down pressure possible and 600 cfm of air delivered at 100 psi, results, reports Schramm, are improved chip clearing and dewatering, cleaner holes, higher penetration rates and longer bit life.

TOUGHER STEEL—Average savings of 4 to 6% in the weight of steel structures are promised by a new and higher yield point structural carbon steel, according to United States Steel Corp., Pittsburgh. The new steel, comforming to specification A-36-60T for rolled structural steel (recently approved by the American So-

NEW LIGHTWEIGHT CONVEYOR BELT AFFORDS SUBSTANTIAL OPERATING ECONOMIES

RECENTLY INTRODUCED WOVEN CARCASS NEOPRENE BELT HAS ALREADY PROVEN ITS SUPERIORITY IN RUGGED UNDERGROUND MINING SERVICE

A new kind of conveyor belt, designed around a *revolutionary lightweight woven fabric carcass,* is proving itself in severe mining service.

Because of the strength and toughness of its interwoven carcass, the new belt has a long life expectancy. It's flexible . . . troughs and trains well . . . and does an excellent job of coal handling.

Top and bottom covers of Du Pont *neoprene* contribute to the belt's superiority. Neoprene provides needed *safety* because it is fire-resistant; will not support combustion. It gives improved *performance* because its high coefficient of friction eliminates power loss caused by slippage . . . reduces belt "run out" at loading points. Neoprene provides greater *economy* because its *balanced combination of properties* affords resistance to abrasion and impact; protects belt carcass from damage by acid mine water, mildew, and oil or grease sometimes present in mining operations.

Other advantages are cited for the new belt. For example, it's easier to handle and install, has longer wearing edges, holds splices and trains better. In addition, better flexibility and handling ease result in increased operating efficiency.

We'd be happy to tell you more about the dependability and long life of a neoprene belt. For more information on this radical improvement in belt construction—and sources of supply—write E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Dept. CA-10, Wilmington 98, Del.

DU PONT REG. U. S. PAT. OFF.

NEOPRENE
SYNTHETIC RUBBER

Better Things for Better Living . . . *through Chemistry*

X-A-R ABRASION RESISTANT STEEL

ARMS CUTTING BLADE WITH HARD, TOUGH EDGES

Steel

Look for the STEELMARK on the products you buy; place it on the products you sell.

The business end of this land-clearing blade takes a real beating from terrain and timber. It downs brush, trees of all sizes—everything in its path. Shears off stumps at ground level. Piles cut materials into windrows. Drives its stinger through sturdy large trees to split and weaken them. Cuts a wide swath below ground level to build V-type drainage ditches. Works long, hard and fast. ◆ The point of it all? Edges made from ¾" and 1" X-A-R 15 with a hardness of 360 BHN. X-A-R is the name for tougher, harder alloy steels developed by Great Lakes Steel especially to meet abrasion problems. They're made to work better and last longer wherever materials collide with equipment—as liners, teeth, bars, blades, and plates for example. *Under conditions that commonly wear out equipment in a hurry, X-A-R*

Great Lakes Steel is a division of

X-A-R STEELS ARE AVAILABLE AT THESE STEEL SERVICE CENTERS

Benedict-Miller, Inc. Lyndhurst, New Jersey	Joseph Demsey Co. Cleveland, Ohio	Ducommun Metals & Supply Co. Los Angeles, California	Interstate Steel Co. Evanston, Illinois	Lockhart Iron & Steel Co. Pittsburgh, Pennsylvania

Rome K/G Clearing Blades made of X-A-R—manufactured by Rome Plow Company, Cedartown, Georgia

FOR QUICK, ECONOMICAL LAND CLEARING

outwears any other type of steel. ◆ Close control during heat-treating, quenching and tempering is the secret of low carbon alloy X-A-R steels. And workability is as favorable as their hardness and toughness. Difficult problems, such as welding under cold conditions or extensive flame cutting, are handled well by X-A-R 30. For *extremely* difficult problems, choose X-A-R 15. ◆ X-A-R abrasion resistant steels, supplied in hardnesses from 360-400 BHN (or, by agreement, in lower Brinell hardnesses), are immediately available in ⅛″ to 1″ thicknesses, widths up to 72″ and lengths up to 35′. For complete technical information, write Great Lakes Steel Corporation.

X-A-R

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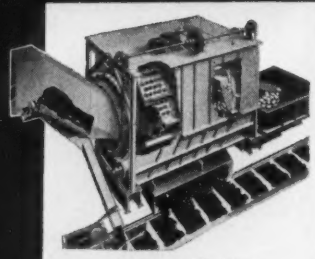
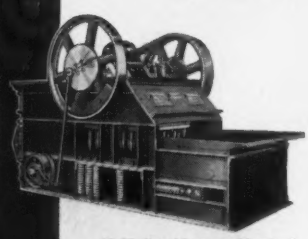
America's most complete line of CRUSHING EQUIPMENT



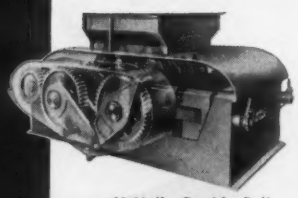
McNally Pittsburg Rotary Breaker

This unit allows positive control of top size in handling run-of-mine washery feed. Production of fines is held to a minimum.



McNally Norton Vertical Pick Breaker

50% Less fines when reducing lump to egg and stove sizes.

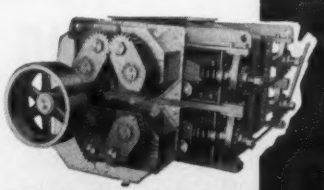


McNally Double Roll Gearmatic ROM Breaker

Built in tonnage ranges from 750 tph to 1400 tph. Full floating gearmatic drive.

McNally Gearmatic Stoker Coal Crusher

This unit offers three prime advantages: high volume production, plus accurate sizing, plus low percentage of fines.



McNally Two Stage Crusher

This unit consists of a double roll primary crusher mounted above a double roll secondary crusher—compactly arranged into a single rigid structure.

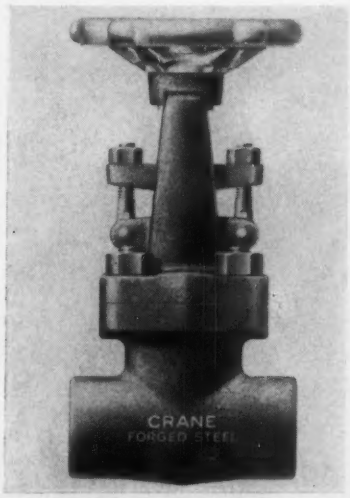
Available From Stock and on Short Delivery
For immediate action on complete information write, wire, or call

McNALLY PITTSBURG MFG. CORP.

Pittsburg, Kansas Wellston, Ohio

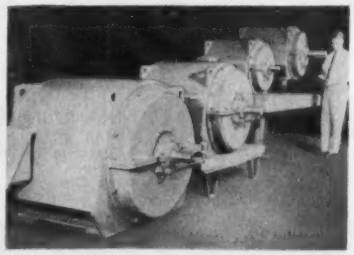
Equipment News *(Continued)*

ciety for Testing Materials), has a minimum yield point (point at which a load applied in tension will cause permanent deformation) of 36,000 lb per sq in. The other well-known carbon steels, ASTM A7 and ASTM A373, have minimum yield points of 33,000 and 32,000 lb respectively. The new steel compares favorably from a weldability standpoint, notes U. S. Steel.

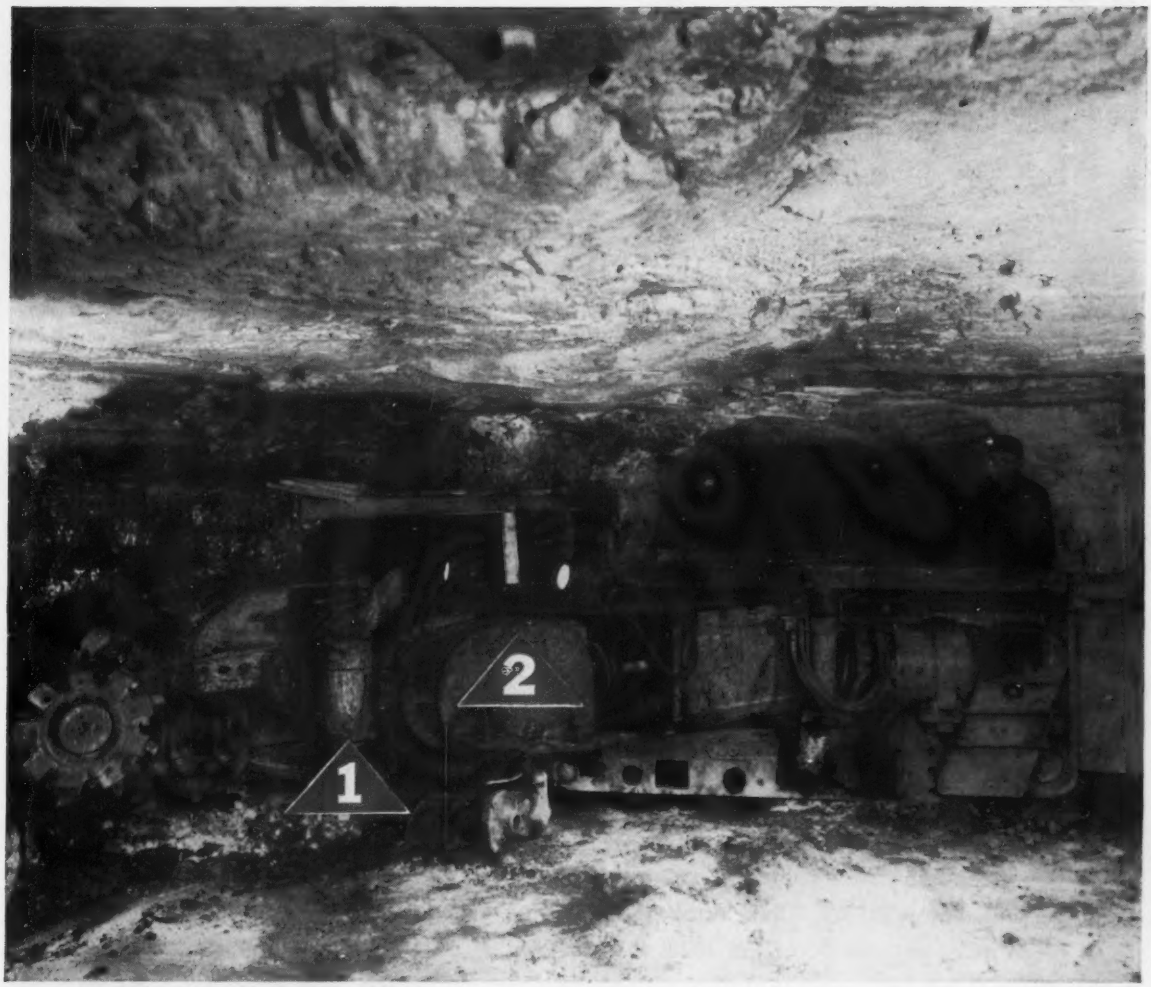


VALVES—A series of new forged steel gate valves redesigned for extra life and easier maintenance has been announced by the Industrial Products Group, Crane Co., Chicago 5. Available in sizes from ¼ to 2 in, the valves are suited for steam, water, air, gas, oil vapor, fuel oil, gasoline and similar needs – up to 1,000 F on oil and oil vapor and 850 F on steam and general services. Features include malleable iron wheel with non-slip gripping knobs, stem of heat-treated Crane Exelloy, and ductile Ni-Resist yoke sleeve offering high melting point and good resistance to atmospheric corrosion.

OFFICE ITEM—A new electric file, the Electro Kardex, brings speed and efficiency of push-button filing to offices where visible records are profitably employed, according to the manufacturer, Rand Systems Div., Sperry Rand Corp., New York 10. The machine is said to be the only mechanized visible file on the market, putting under finger-tip control of the operator more than 4,000 visible records. Efficiency can be added, says Sperry, to records such as inventory control, personnel records, purchasing, production, costs and sales. By pushing a button, the operator finds a slide containing the record she seeks positioned in front of her. The operation takes only 4 seconds. A quick visual run down of the exposed edges of the Kardex pockets brings her to the specific one she wants and a final flip with her finger exposes the complete record.



MOTORS—A new line of large squirrel-cage motors, 250 through 1,000 hp, is announced by Wagner Electric Corp., St. Louis, Mo. Built for heavy-duty industrial applications, these motors feature extremely compact, smoothly contoured, fabricated steel plate enclosures that have great mechanical strength and high resistance to corrosion. For safety and ease of handling, four lifting eyes are built-in as integral parts of the frame ends. Mounting space required is materially reduced by positioning the feet under the



TWO ESSO PRODUCTS MEET ALL UNDERGROUND LUBE NEEDS

1. NUTO® rust- and oxidation-inhibited hydraulic oil gives extended service. Provides outstanding protection against rust in hydraulic systems used in damp mine conditions. Excellent fluidity for fast start-ups at low temperatures. Maintains good body at high operating temperatures to minimize leakage and pump wear.

2. NEBULA® EP 1F a semi-fluid grease for lubricating gears, bearings, clutches and linkages. Provides extreme-pressure and anti-wear qualities. Inhibits oxidation over long service. Minimizes leakage through seals by virtue of its semi-fluid consistency, unchanged by heat or churning. Nebula EP 1 in convenient cartridge form is recommended for electric motors.

Esso

For more information about time and machine saving Esso lubricants, contact your local Esso office or write: Esso Standard, Division of Humble Oil & Refining Company, 15 West 51st Street, New York 19, New York.

In industry after industry..."ESSO RESEARCH works wonders with oil"

More work out of trucks ...at Lower Cost?

EATON 2-SPEED AXLES WILL DO IT!

On-the-job performance records prove that trucks equipped with Eaton 2-Speed Axles make quicker trips, travel more miles at lower cost per mile. By providing *double* the conventional number of gear ratios—the right gear ratio for every road and load—they reduce stress and wear on engine and power transmitting parts; permit engines to run efficiently under all operating conditions.

Eaton's exclusive features, including forced-flow lubrication, planetary gearing, and Inductalloy Axle Shafts, add thousands of miles to axle life, and eliminate costly maintenance expense worries.

Ask your dealer to explain how Eaton 2-Speed Axles reduce hauling costs, add to profits, and make trucks worth more on the trade-in.

EATON
2-SPEED
AXLES

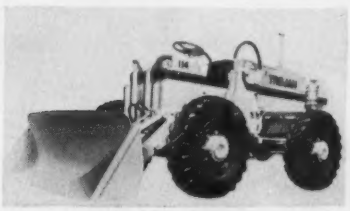
More than 2 Million Eaton Axles in Trucks Today

EATON

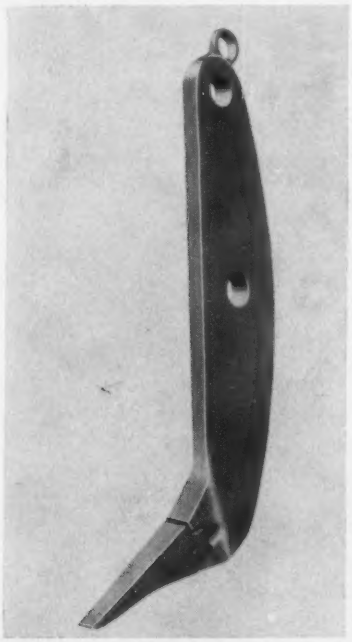
AXLE DIVISION
MANUFACTURING COMPANY
CLEVELAND 10, OHIO

Equipment News (*Continued*)

overhang of the frame. The flat steel endplates are built in two sections, facilitating disassembly for bearing inspection. The enclosure is completely drip-proof with ventilating openings so located and shielded as to provide essentially splash-proof protection.



TRACTOR SHOVEL – The Yale & Towne Mfg. Co., Batavia, N. Y., has added a tractor with 6,500 lb lifting capacity to its Trojan line. With bucket sizes from 1 to 1⅝ cu yd, the new tractor shovel, Model 114, brings big machine features and working ranges far above the average in its class, according to the company. Features include powershift transmission, planetary axles, power steering and vacuum-boosted hydraulic power brakes, permitting operators to reach maximum production and flexibility, adds the company.

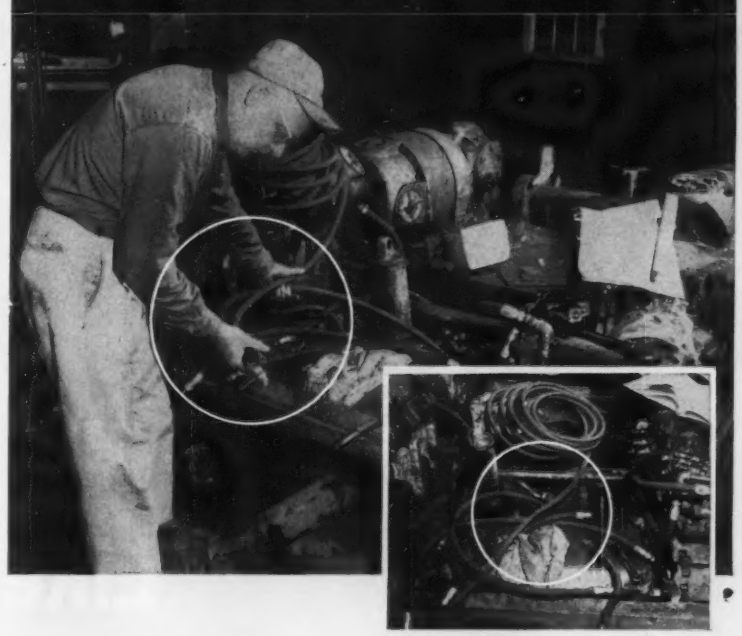


NEW RIPPER POINT–Increased ripping yardage is possible with a new ripper point, reports the Construction Equipment Div., Electric Steel Foundry Co., Portland 10, Ore. Ripping advantages of the point result from radical length, narrowness and sharpness of the design and a new ESCO alloy, "12S," specifically

"Because of Better Results,"

reports Miles Davis, Supt. of Maintenance, Penn Coal and Coke Co., Erenfield, Pa., "Have always gone back to . . .

Aeroquip *Hose and Reusable Fittings"*



They need the best in the repair shop at Penn Coal to keep machines on the job for their three-shift day. After testing against other products, they have found Aeroquip Hose and Reusable Fittings give better results. So easy to use, too. A small inventory covers all needs and assembly requires no special tools or training.

Our files are full of enthusiastic reports from users that prove you're in good hands when you consult with Aeroquip. Your Aeroquip Distributor, a fluid line specialist, will give you our 204 Catalog. He'll discuss various applications that might be helpful to you. His number is in the "Yellow Pages" under "Hose."

Aeroquip is so easy to use—inventory's just a few feet of hose and a handful of fittings.

STANDARDIZE ON Aeroquip

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AEROQUIP CORPORATION, JACKSON, MICHIGAN

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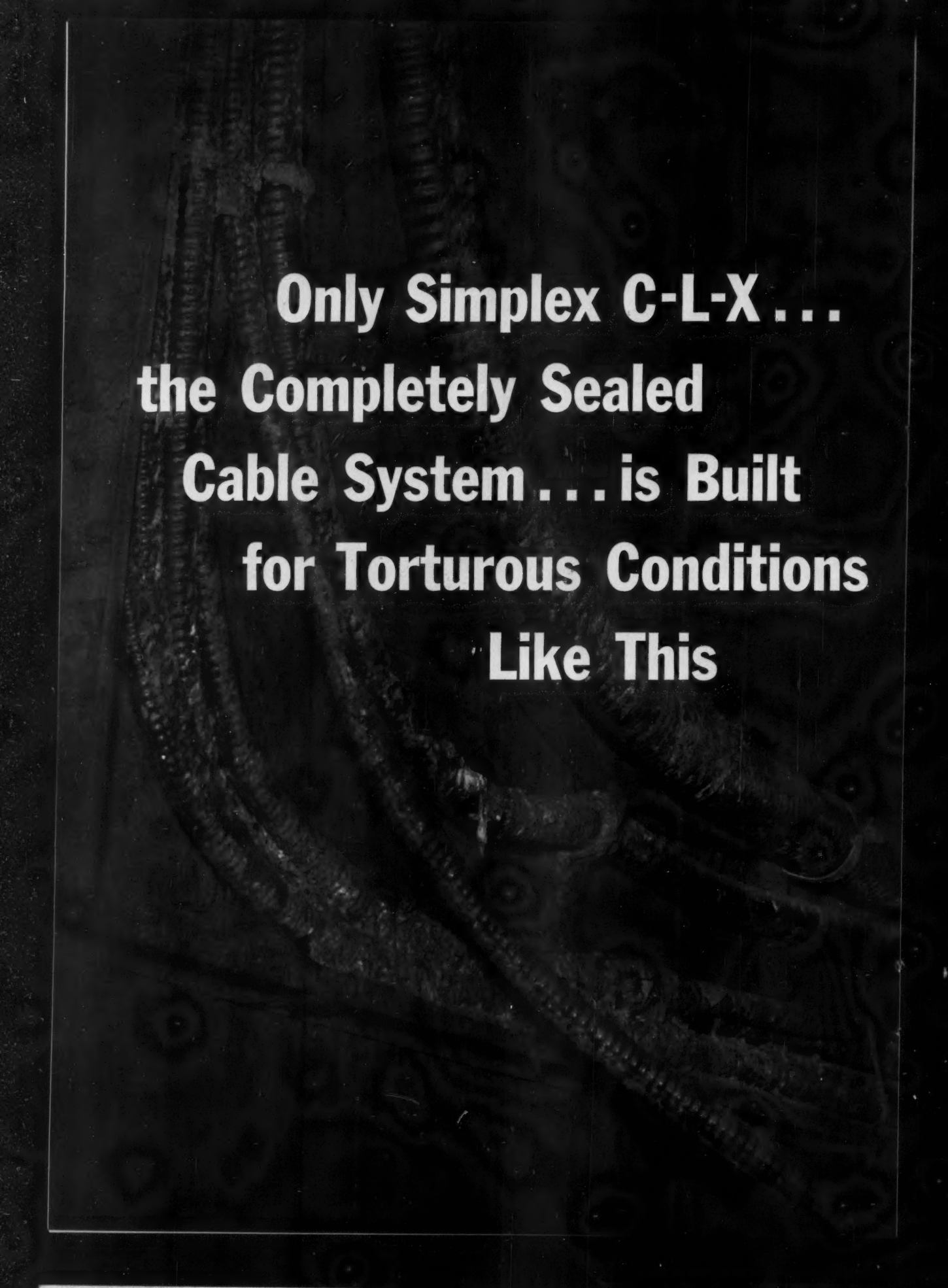
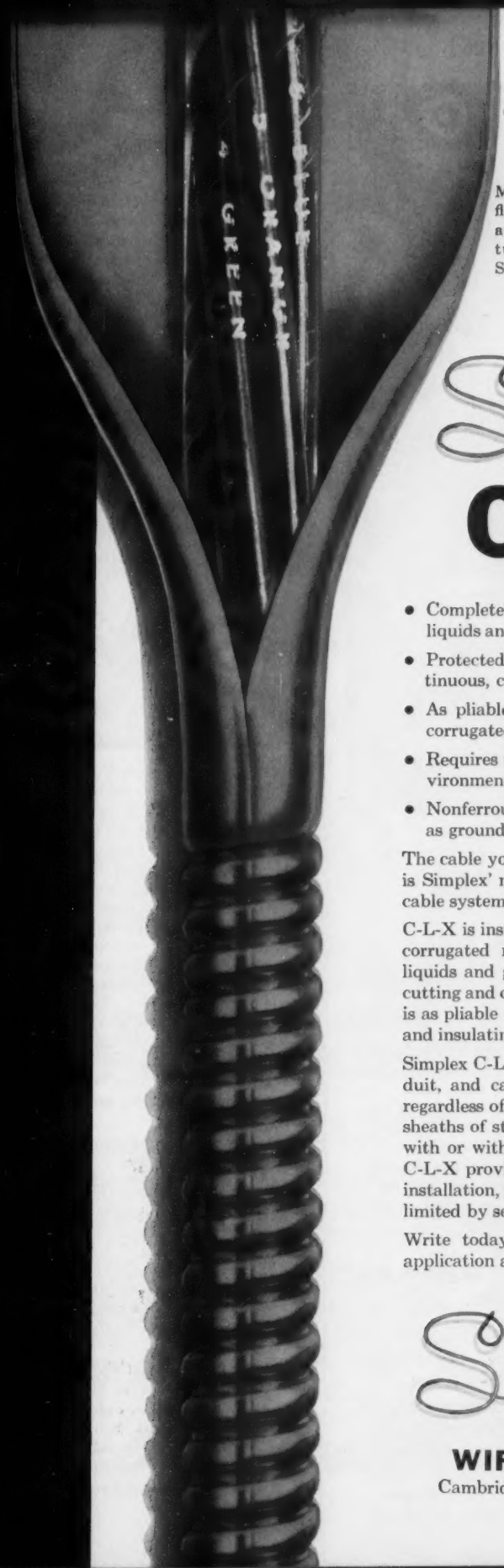
AEROQUIP (CANADA) LTD., TORONTO 19, ONTARIO

AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN CANADA, U.S.A. AND ABROAD


Only Simplex C-L-X . . .
the Completely Sealed
Cable System . . . is Built
for Torturous Conditions
Like This



Simplex C-L-X combines cable and duct in one integrated system

Metal, in the form of a continuous flat strip, is formed into a welded tube around the insulated cable. The metal tube is then corrugated to form Simplex C-L-X.

Simplex C-L-X

- Completely sealed to prevent penetration of liquids and gases.
- Protected against mechanical damage by a continuous, corrugated metallic sheath.
- As pliable as unsheathed cable because of its corrugated design.
- Requires no separate duct or conduit in any environment.
- Nonferrous sheaths can be designed to function as grounds or shielding.

The cable you see here is *not* interlocked armor. It is Simplex' new C-L-X . . . the completely sealed cable system.

C-L-X is insulated cable enclosed in a continuous corrugated metallic sheath. It is impervious to liquids and gases, is highly resistant to crushing, cutting and other forms of mechanical damage, and is as pliable as unsheathed cable of the same size and insulating compound.

Simplex C-L-X requires no separate duct or conduit, and can be installed in a continuous run regardless of the number of bends. Available with sheaths of steel, aluminum, copper or bronze, and with or without outer plastic jacketing, Simplex C-L-X provides the ideal solution for almost any installation, particularly those in which cable life is limited by severe ambient conditions.

Write today for illustrated brochure containing application and engineering information.

Simplex

WIRE & CABLE CO.

Cambridge, Mass. • Newington, N. H.

Carrier Amplitrol Grizzly-Feeder for use with crushers separates undersized material. Tapered bars minimize blinding. Feeder control allows manual or automatic capacity control at any distance from feeder.

CARRIER *GRIZZLY*-FEEDER

with full-range capacity control

Carrier Amplitrol Grizzly-Feeders accurately control material flow rates and simultaneously scalp "fines"—assuring maximum crusher capacity and efficiency. Uniform, full-width feeding prevents uneven crusher wear. Simple, automatic controls respond instantly to crusher load fluctuations—constantly adjust Amplitrol output to produce peak crusher performance without flooding or starving.

Compare These Amplitrol Features

More capacity under head load with Natural Frequency design and *"long-stroke"* trough vibrations.

Dust- and dirt-proof drive—no close clearances to keep clean.

A.C. drive motor operates on standard power circuits—no D.C. rectifying equipment required.

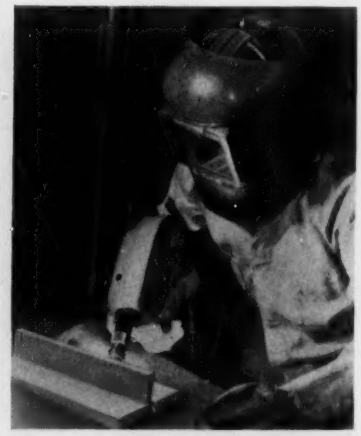
Simple mechanical drive—Amplitrol drives never need "tuning." Wear plates can be added in the field without difficulty.

For more information, write for Grizzly-Feeder Bulletin No. 60-226, Carrier Division, CHAIN Belt Company, 212 Jackson St., Louisville, Ky.

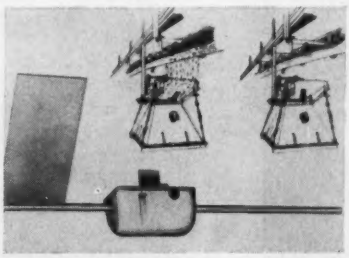
CARRIER
-NATURAL-FREQUENCY-
VIBRATING EQUIPMENT
CHAIN Belt Company

CONVEY • FEED
DEWATER • SCREEN
COOL • DRY
SCALP • COAT
DISTRIBUTE • ELEVATE

developed for ripping. The extra length of the point shatters material well ahead of the ripper shank, greatly reducing shank wear, notes the firm. This feature, coupled with the flat pitch of the point design, reduces the drawbar load and sometimes permits the tractor to operate in a higher gear. The company markets four points, 20, 18, 16 and 14 in. The 20 incher provides long service in easily ripped material; the 18 incher is for general use; and the 16- and 14-in units are for tough materials.

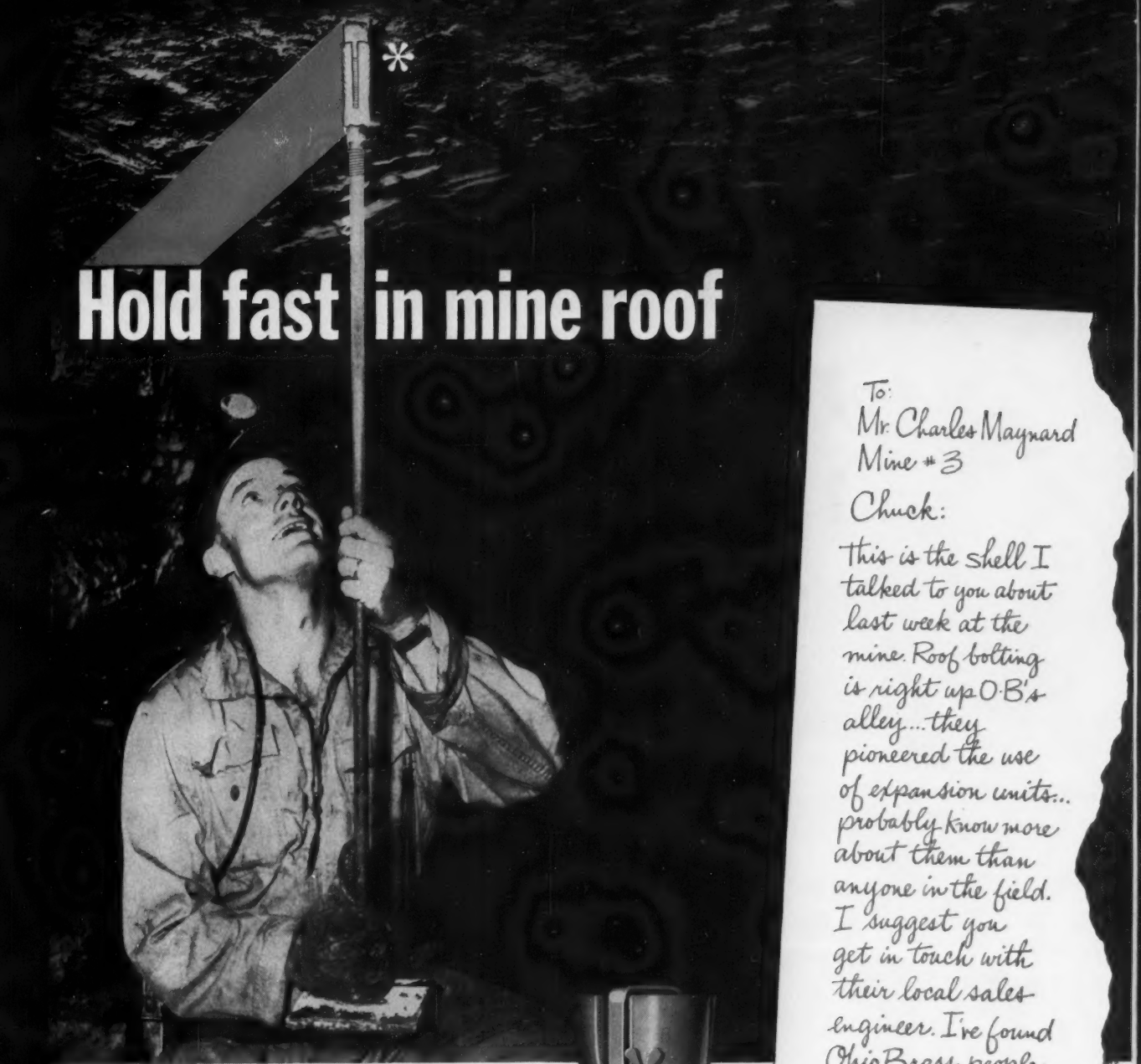


WELDING—A new manual Aircomatic welding gun and controls has been developed by Air Reduction Sales Co., New York 17. The unit, "MIGet," is designed for use in light to heavy fabrication where numerous short welds, off the ground welding or emergency repairs are needed. The gun carries its own compact reel of wire and complete-range wire speed control. The operator can work as far as 50 ft from the control panel, which, in turn, can be placed 150 ft from a power source. The gun weighs about 2½ lb, the control less than 20 lb. The control, housed in a small NEMA cabinet with a carrying handle on top and cable and hose fitting on the bottom, coordinates the wire feed and welding current.



FLOW SWITCH—Model FS-1 is a new flow switch from Syntron Co., Homer City, Pa., designed to respond to the lack of material at a critical point in a bulk material handling system and automati-

Hold fast in mine roof



To:
Mr. Charles Maynard
Mine # 3

Chuck:

This is the shell I talked to you about last week at the mine. Roof bolting is right up O-B's alley... they pioneered the use of expansion units... probably know more about them than anyone in the field. I suggest you get in touch with their local sales engineer. I've found Ohio Brass people are glad to work right with you in the mine.

Regards,
Jack

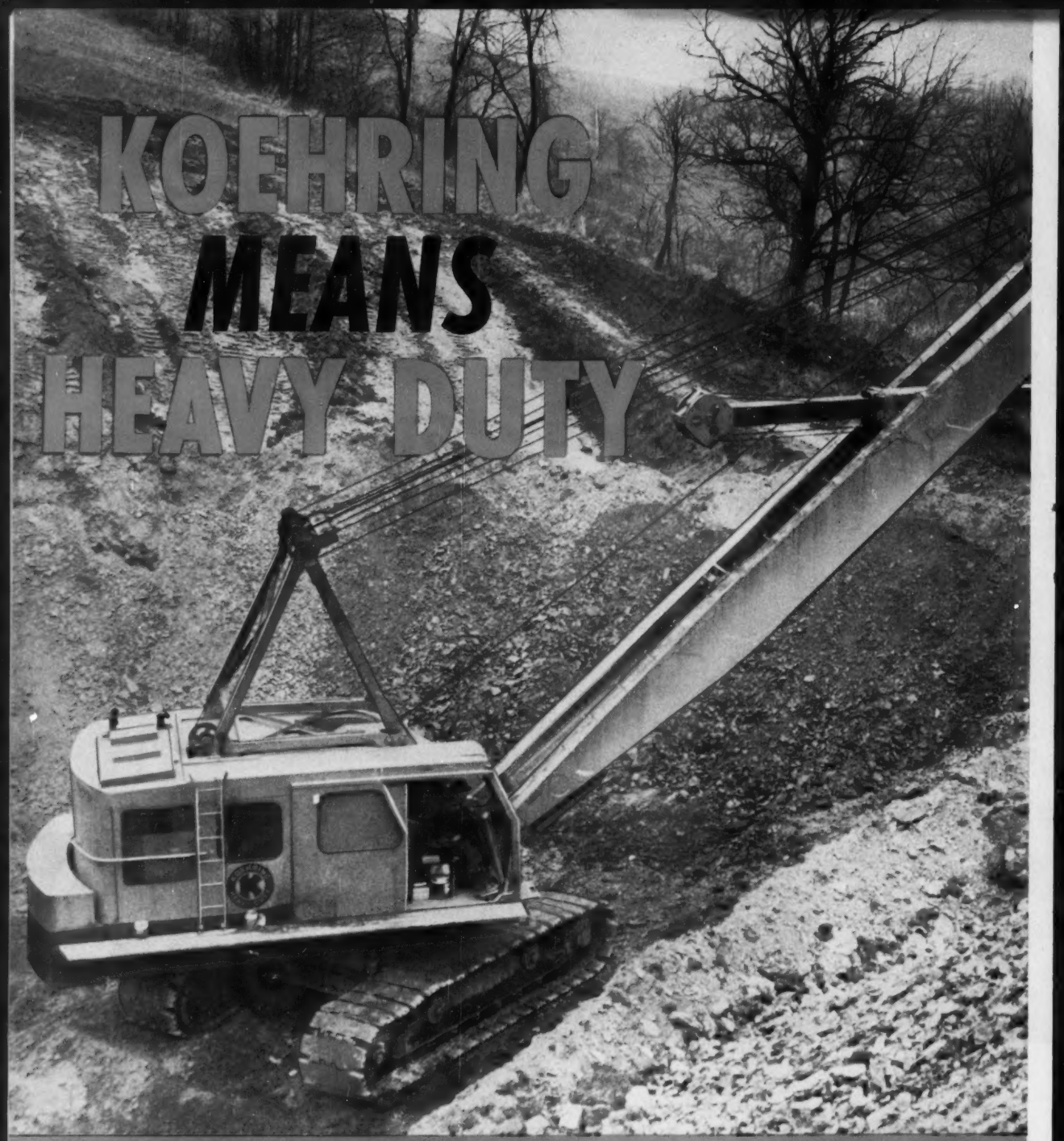
Ohio Brass 4-Way Expanding Anchors hold in both soft shale and hard rock

- **GO UP FAST** . . . 4-way expansion begins with the first turn of the wrench.
- **DEVELOP TOP HOLDING POWER** with easy wrenching effort . . . 150 "foot pounds" of torque gives bolt tensions of 9000 pounds.
- **WORK IN CLOSE QUARTERS** . . . O-B engineers developed these anchors underground. Personal knowledge of mining problems enabled them to design units that are especially suited to your needs.
- **GET SERVICE** for your roof bolting problems . . . see your local Ohio Brass engineering representative or write Ohio Brass Company, Mansfield, Ohio.

O-B Bail Type Expansion Shell and Plug

Ohio Brass OB HOLAN

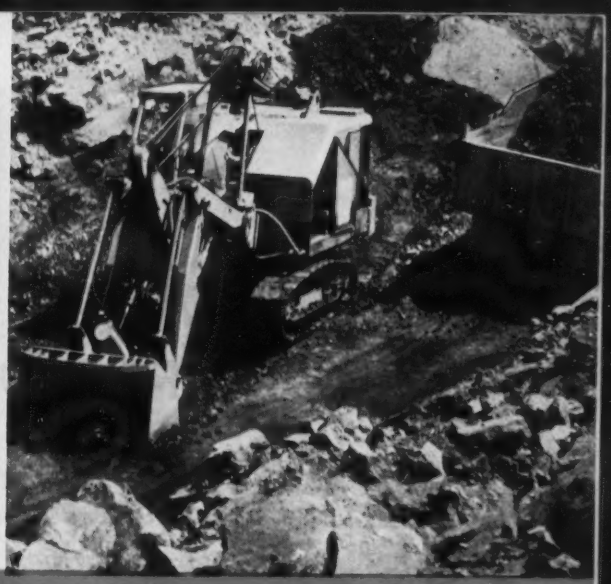
EXPANSION SHELLS AND PLUGS • LINE MATERIALS • SAFETY AND CONTROL EQUIPMENT • ELECTRIC HAULAGE MATERIALS



The words "HEAVY DUTY" are an important part of the Koehring trademark . . . have been for years. And there's a mighty good reason: Koehring excavators have proved through millions of hours of service that you can count on them to outproduce and outlast other makes even under the most severe digging conditions. They're *heavy duty* through and through.

Take the front end of the 1205 stripper. With a 3-yd. dipper, digging height is 42′ 10″, dumping height, 31′ 5″ (40′ boom at 45° angle). You get long range capacity and low maintenance because the front end consists of a twin box frame boom connected by sturdy torque tubes, twin large diameter boom point sheaves, and a strong box section welded dipper stick . . . real *heavy duty* dependability at the business end. Or take the crawlers. Each individual shoe is actually strong enough to support the entire machine plus its rated load. Or take the main machinery. Shafts are kept in perfect alignment because integral side stands are line bored in place as a unit.

Yes, Koehring *means* Heavy Duty. That's why you can *expect* more from a Koehring excavator . . . why you *get* more from a Koehring. See your Koehring distributor for more details on the Koehring heavy duty story.



▲ Koehring 205 Skooper has 7' level crowd . . . tremendous breakout ability for digging and loading stripped coal. Bucket capacity: 2 yards. Clearance height at end of dump: 10' 5". There's nothing like it on wheels or tracks.

▼ Koehring 605 Dragline is a high production — low-cost per yard unit. Can be used with 50 to 110 feet of boom — with 1½ to 2½ cubic yard dragline bucket.

KOEHRING HEAVY DUTY

KOEHRING

DIVISION OF KOEHRING COMPANY

Milwaukee 16, Wisconsin

More Work Capacity . . . More Profit Per Dollar Invested!

K23

NO GUESSWORK... QUALITY IS CERTIFIED!

With Republic Mine Roof Bolts steel chemistry, yield point, and break point are known quantities

Republic takes the guesswork out of mine roof bolt buying. You get certified performance. Performance you can depend on every time, because every step of Republic Mine Roof Bolt manufacture—from raw ore to finished bolt—is carefully controlled, precision checked, and inspected. Every Republic bolt shipment includes a certificate stating specific physical properties of the steel used.

Five certified-performance features—you get them only from Republic—add up to an extra margin of mine safety. Economy? Mining companies report Republic Bolts are making profitable operations possible in areas where the high cost of shoring could force mine shutdowns.

Because mine roof bolts can be used effectively in many different types of strata, no single design is best for all applications. Republic's Field Service Team has worked with mine operators in every part of the country to develop bolts to best meet specific requirements. This obligation-free service is available to you. Write or send coupon today.

1 PRECISION-TAPERED PLUG

Engineered for proper shell expansion. Precise degree of taper required for strength, dependability, efficient tightening.

2 HIGH-STRENGTH, ALL-PURPOSE EXPANSION SHELL

Wide, strong leaves mean extra holding power. Narrow base supports for easy expansion, wedge like grip.

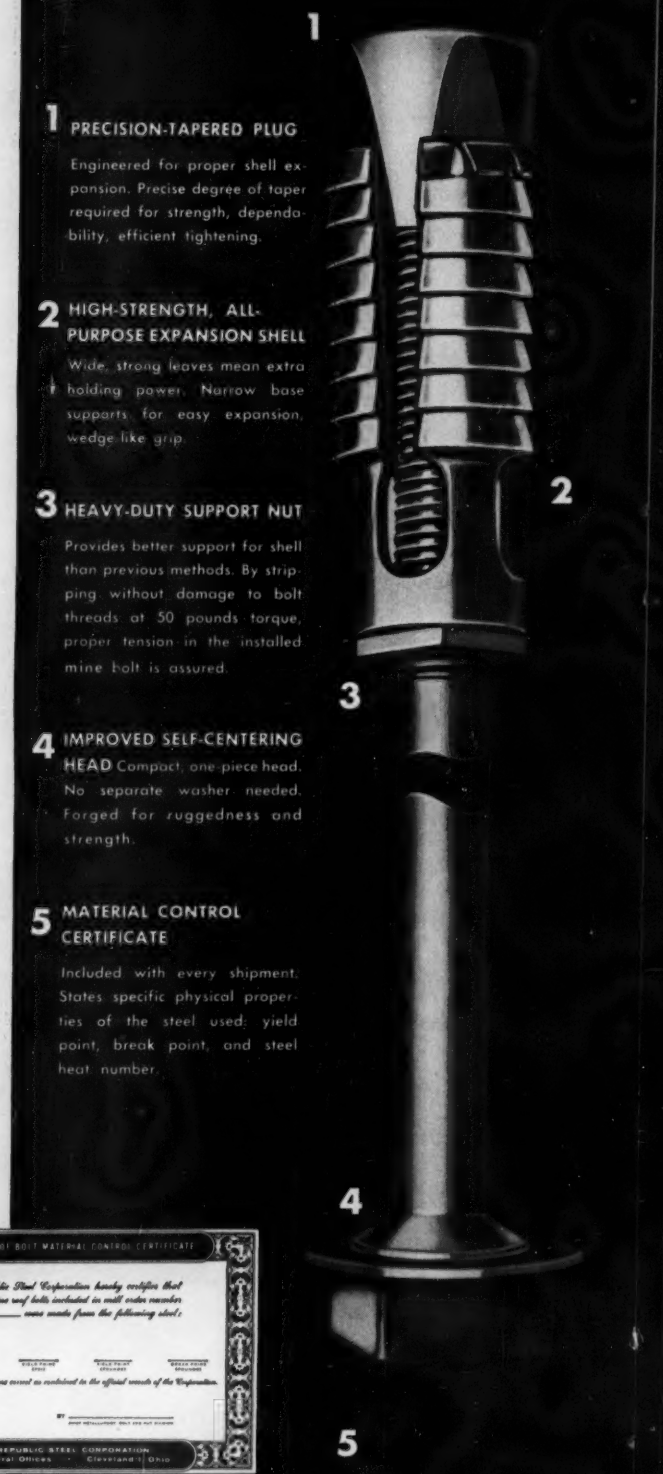
3 HEAVY-DUTY SUPPORT NUT

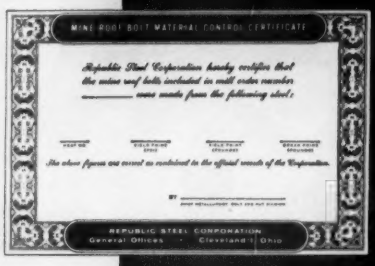
Provides better support for shell than previous methods. By stripping without damage to bolt threads at 50 pounds torque, proper tension in the installed mine bolt is assured.

4 IMPROVED SELF-CENTERING HEAD Compact, one-piece head. No separate washer needed. Forged for ruggedness and strength.

5 MATERIAL CONTROL CERTIFICATE

Included with every shipment. States specific physical properties of the steel used: yield point, break point, and steel heat number.




MINE ROOF BOLT MATERIAL CONTROL CERTIFICATE

Republic Steel Corporation hereby certifies that the mine roof bolts included in mill order number ——— were made from the following steel:

The above figures are correct as contained in the official records of the Corporation.

BY ———

REPUBLIC STEEL CORPORATION
General Offices — Cleveland 1, Ohio

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

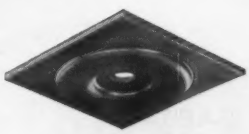
CORROSIVE ELEMENTS,
and moisture, found around mining operations, are tough on standard conduit. Answer: *Republic* ELECTRUNITE® *"Dekoron®-Coated" E.M.T.*, made from highest-quality flat rolled open hearth steel, armor-coated from end to end with corrosion-proof polyethylene. Easy to cut to length and bend to fit installation. ELECTRUNITE "Dekoron-Coated" E.M.T. costs less to install, less to maintain. Plastic coated rigid steel conduit also available. Mail coupon for more information.

ABRASION-RESISTING PERFORMANCE
of *Republic High Strength Steel* makes it ideal for use in coal and ore discharge chutes, hopper and mine cars. Equipment built with Republic High Strength Steel withstands continual pounding and abrasion, is more corrosion-resistant and weighs less than similar equipment constructed of plain carbon steel. Send coupon for additional information.

MINE WATER PROBLEMS?
Solve them the easy, low-cost way—with *Republic Flexible Plastic Pipe*. Made of tough polyethylene, it is impervious to corrosive elements found in mine water. Lightweight Republic FE® Plastic Pipe is easy to handle, easy to cut and join. Can be quickly relocated to meet changing conditions. Mail coupon for further information about Republic Plastic Pipe.

AVAILABLE PRE-ASSEMBLED TO CUT YOUR INSTALLATION COSTS

You can order your Republic Certified-Performance Roof Bolts fully assembled to save you assembly costs, prevent loss of parts and damage to bolt threads. Specify Republic Roof Bolt Plates, too.



REPUBLIC STEEL CORPORATION
DEPT. CA-9670R
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send me further information on:
☐ Republic Mine Roof Bolt Field Service
☐ Mine Roof Bolts ☐ High Strength Steel
☐ Plastic Pipe
☐ ELECTRUNITE "Dekoron-Coated" E.M.T.

Name_____ Title_____
Company_____
Address_____
City_____ Zone____ State_____

MORE A-C POWER *where you need it—*

SAFELY—

with new

PLM

7½ kv Cable Couplers

You can put a-c power to work quickly . . . safely . . . *profitably*, at voltages up to 7½ kv, with new, heavy-duty PLM Cable Couplers. They give plug-in convenience for connecting and extending power cables, as needed, for shovels or other equipment. They're built, electrically and mechanically, expressly for open-pit and deep mining service. They enable wider use of the many benefits of a-c power in higher distribution and utilization voltages.

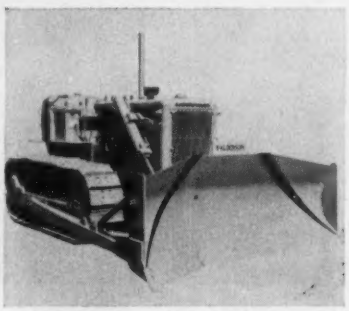
PLM Cable Couplers are supplied for flange, foot or sled mounting as standard plug and socket, or as 2, 3 and 4-way junction box assemblies. High-strength cast aluminum housings—electrical and/or mechanical safety interlocks. Can be applied directly to cable in the field. Write for bulletin. PLM Products, Inc., 3881 W. 150th St., Cleveland 11, Ohio.

7½ kv 300-ampere PLM CABLE COUPLERS

Equipment News (*Continued*)

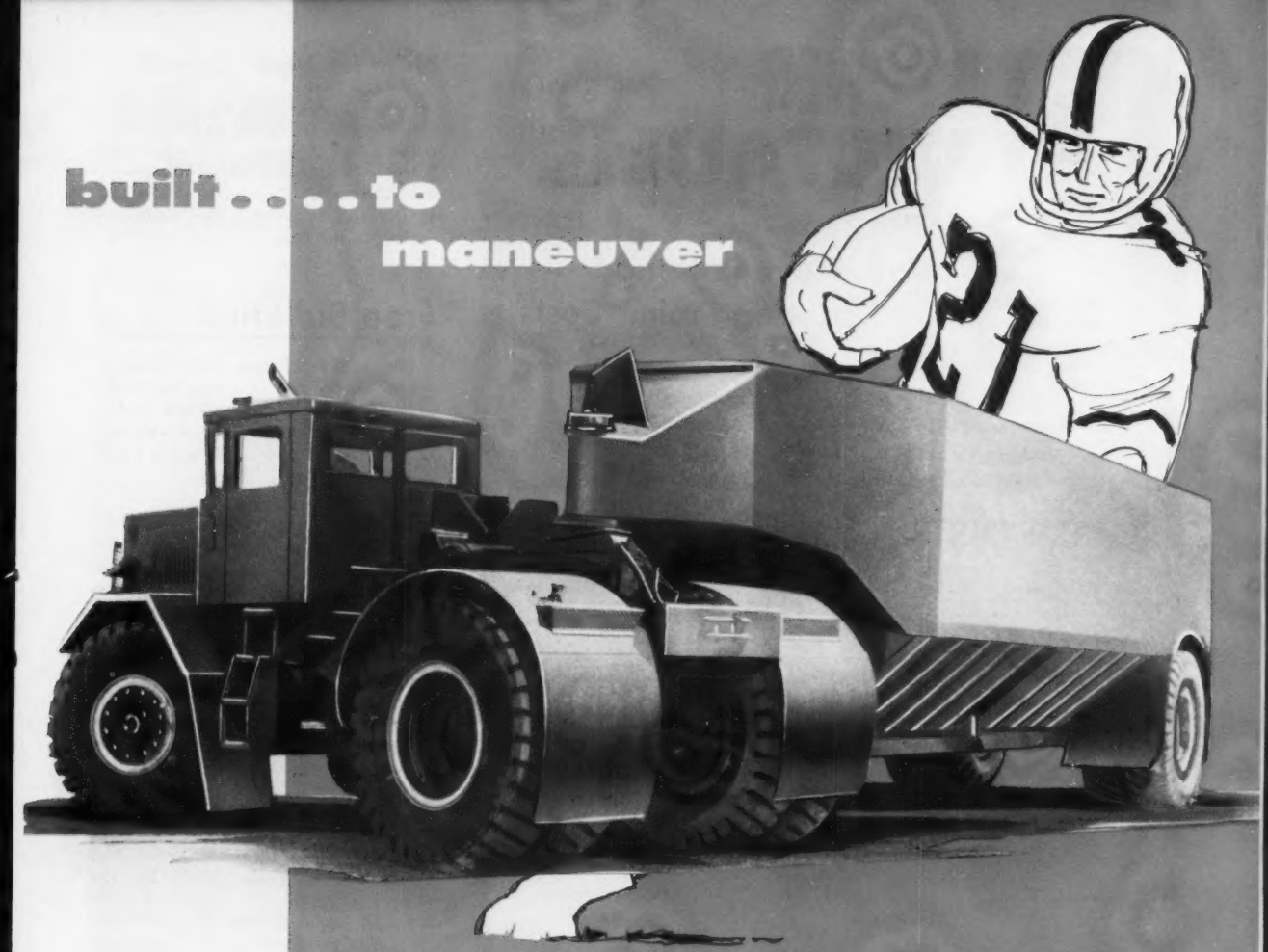
cally correct the difficulty or sound an alarm. The flow of material past the switch deflects the flap and holds it out of operating position. When the flow of material stops and there is none to hold the flap in a deflected position, it swings back into operating position and actuates the switch. A number of switches can be used in one system, each located at a critical point. Switches are sturdily constructed to provide a long trouble-free life, according to the firm. Rating is 1 amp at 115 V, .5 amp at 230 V, AC.

MORE CAPACITY—Rish Equipment Co., Bluefield, W. Va., distributor of construction equipment for International Harvester, now offers the Rish coal blade, said to double the capacity of standard dozer moldboards and triple the economical pushing distance of conventional dozers. Available for use with the International TD-25, TD-20 and TD-15 crawlers, three new wing-type blades are made of high-carbon steel and can be used with direct-lift hydraulic or rear-mounted cable control units. In recent tests, according to International Harvester, the TD-25 with matched Rish blade averaged 20.9 tons at 2.55 mph average speeds.



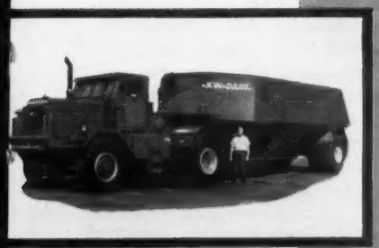
NEW BLADES—Two sizes of U-blades for the new Cat D6B tractor are now available from Balderson, Inc., Wamego, Kan. The regular size BD6U blade (photo), 9 ft 6 in, is designed to do heavy-duty work. The extra-large BD6U-12, a 12-ft blade, is especially for electric power plants and industries which have coal-handling requirements to match its greater capacity. Balderson U-blades are interchangeable with Cat straight blades on dozers in the field, notes the firm. On new installations, the Balderson U-blade

built . . . . to maneuver



. . to save time and money . . .

To minimize coal haulage costs, a coal hauler must twist and turn like a quarterback; it must climb like a tank, and ride like a pullman on the haul road. **KW-DART'S** big 70 tonner does all this and operates at high efficiency at the same time. It will pay you to investigate how **KW-DART** units can increase production and reduce costs. Their performance is proved in many U. S. and foreign mines. Their design is the result of truck building experience dating back to 1903!



KW-DART 50S-BDT, 50 ton coal hauler. Mine records prove the unusual economy of this popular model.

KW-DART offers a complete line of custom-engineered off-highway trucks in capacities from 10 tons to 80 tons.

KW-DART TRUCK CO.

Division of Pacific Car and Foundry Company

1301 North Manchester Trafficway
Kansas City 41, Missouri, U.S.A.
Cable Address: DARTRUCO

P.O. Box 321

156

VICTAULIC®

The Time-and Job-Proven Method of Reducing Piping Costs

Let the Victaulic Method save you money on piping costs. Whatever piping material you choose, Victaulic can join it and provide fittings. You save in material cost, in installation time, and in reduced piping maintenance cost.

CUT COSTS WITH OVER 1100 VICTAULIC ITEMS FOR BETTER AND EASIER PIPING

For complete information on any Victaulic product, write:

VICTAULIC COMPANY OF AMERICA

Dept. 14-10, P. O. Box 509, Elizabeth, N. J.

Equipment News (*Continued*)

uses Cat push arms and braces. The U-shaped blades are said to give greater capacity than straight or angling blades. When backed by the new D6B's power and drawbar pull, greater production at no increased fuel cost is the result, according to the firm.

Free Bulletins

Idlers—"Deep Trough Belt Conveyor Idlers," is the title of a new 8-p book, No. 2716A, with data on 60 new 35-deg deep trough idlers and 24 new additions to Link-Belt's line of 45-deg idlers. Link-Belt Co., Chicago 1, Ill.

Engines — Twenty-seven International diesel and carbureted engines in 4-, 6-, and 8-cylinder versions, are detailed in a new pamphlet for International Harvester Co.'s Construction Equipment Div., 180 N. Michigan Ave., Chicago 1.

Tractor—A brochure featuring a new model of the Napco Crab four-wheel drive, four-wheel steer industrial and construction tractor has been made available. Construction Equipment Div., Napco Industries, Inc., 834 N. Seventh St., Minneapolis 11.

Insulation — Increased reliability, greater versatility and longer life are themes of the booklet on the characteristics of wire and cable insulated with Silastic-brand silicone rubber. Dow Corning Corp., Midland, Mich.

Plastic Pipe — Two-page catalog is available describing advantages offered by SRK plastic pipe. Republic Steel Corp., 1441 Republic Bldg., Cleveland 1.

Crushers—A new bulletin, No. 4020, describes the complete line of crushers from Pennsylvania Crusher Div., Bath Iron Works Corp., West Chester, Pa.

Drives—Bulletin 111 covers Syncro-Range drives, in sizes 2 to 15 hp, providing adjustable speed of synchronous induction motors running in exact synchronism over a wide range of speed. The Louis Allis Co., 427 E. Stewart St., Milwaukee 1.

Sprockets — Features which go into making Caterpillar sprockets last longer are covered in an 8-p booklet, Form D-025. Caterpillar Tractor Co., Peoria, Ill.

Industrial Gases—Oxyweld industrial gas regulators and portable manifolds are described and illustrated in a 16-p catalog. Linde Co., Div. of Union Carbide Corp., 270 Park Ave., New York 17.

Curtiss-Wright CW-226 with Hi-Torque brakes carries heavy loads, averaging 90,000 pounds of earth.

Contractor gets trouble-free performance with Hi-Torque brakes on rough, hilly terrain

Completely dependable brake performance, with high stopping power always available, has been reported by Talbott Construction Company, Winchester, Ky. Talbott operates several Curtiss-Wright earthmovers with B.F.Goodrich Hi-Torque brakes.

On one project, the machines were in operation on rough, hilly terrain over a six months period, ten hours a day, six days a week. No adjustments, replacements, or maintenance of any kind was required. Dust and water are effectively sealed out, so the environment presented no ill effects. Automatic adjusters maintain proper clearance, adjust for lining wear.

B.F.Goodrich Hi-Torque brakes cut stopping distance approximately in half, compared to conventional two-shoe brakes. These brakes are now available on heavy dump trucks, tractor-scrapers, coal haulers, mine trucks, and other heavy off-highway vehicles, from several manufacturers. For information ask your equipment maker, or write *B.F.Goodrich Aviation Products, a division of The B.F.Goodrich Company, Department CA-10, Troy, Ohio.*

Hi-Torque brakes permit safe operation on faster cycles.

B.F.Goodrich Hi-Torque brakes

Among the Manufacturers

Thomas W. Casey has been appointed sales represenative in the St. Louis area for the Woven Screen & Screening Machinery Divs. of The W. S. Tyler Co., it was recently announced by Ralph W. Ramer, manager of the firm's central district in Chicago. Mr. Casey, who lives with his family in St. Louis, is familiar with the area he has been assigned to handle. He is a graduate of Ohio Northern University, and is a Captain in the Marine Corps.

Casey

Eugene P. Berg, 47, has been elected executive vice president for Bucyrus-Erie Co., Milwaukee. Mr. Berg had previously been employed as general manager of all Chicago operations for the Link-Belt Co., manufacturer of conveyor equipment, and had been with that firm since 1937. As general manager, he was responsible for manufacturing, finance, engineering, industrial relations and all phases of management.

Berg

Company Briefs

The Electric Storage Battery Co. purchased the Nickel Alkaline Div. from the McGraw-Edison Co.

Dorr-Oliver, Inc., named W. J. Fox vice president, domestic operations and placed D. C. Reybold in charge of research, development and legal and patent functions.

Connellsville Mfg. & Mine Supply Co. changed its name to the Connellsville Corp.

Cummins Engine Co., Inc., named C. R. Boll executive vice president, marketing, and R. W. Franck vice president, sales.

Allis-Chalmers Mfg. Co. appointed H. T. Larmore general product manager, Construction Machinery Div.

Edward S. J. McVickar was appointed manager of mining and welding cables sales, National Electric Div., H. K. Porter Co., Inc., Pittsburgh. For the past 10 yr Mr. McVickar was with General Cable Corp., most recently as product sales manager for special cable marketed in the mining and welding industries. Born in Paris, France, he served with the United States War Shipping Administration during World War II, rising from a seaman to Captain. Mr. McVickar, who plans to move with his wife and five children to Pittsburgh, has been for the past 5 yr an active member of the American Mining Congress, the Open Pit Mining Association, the Illinois Mining Institute and the National Welding Supply Association.

McVickar

James E. Quinn was named general sales manager for Denver Equipment Co., Denver 17, maker of mineral and chemical processing equipment. Mr. Quinn joined the company in 1948 following his graduation from the Colorado School of Mines. He first served as an engineer in the Pricing and Estimating Div., and then as sales engineer in the Export and Domestic Sales Divs. before being named last year as manager of the Western Div., which includes Colorado and 10 other western states. He has also been in charge of the firm's Uranium Processing Equipment Sales Div., and is an internationally recognized authority on uranium ore treatment.

Quinn

Stephen Laskevich Jr., has been appointed district manager for the Knoxville, Tenn., district sales office of Joy Mfg. Co., Pittsburgh. The office covers the states of Kentucky, Tennessee, Virginia, North Carolina, South Carolina, G Georgia, Mississippi and Florida. Mr. Laskevich is responsible for sales and service of Joy's line of rock drilling and related pneumatic equipment to construction, quarrying, open-pit mining and underground metal and hard-rock mining industries in that area.

Laskevich

100 Amp. Mercury Contactor

Continuous rating 60 and 100 amp. sizes, for D.C. and A.C. load, are available in Durakool's Hypressure "Hydrogen Arc Quenched" construction. These heavy load carrying contactors have mercury to metal (tungsten) contacts.

Available in two sizes—

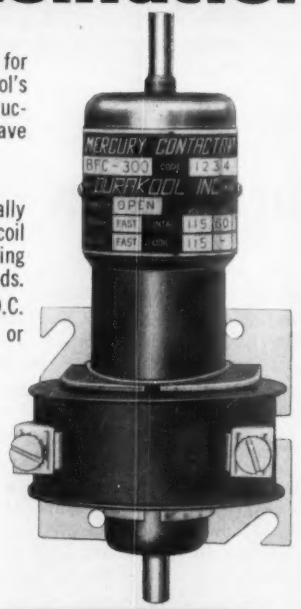
10 KW 100 amp. and 6.6 KW 60 amp., normally open or normally closed contacts and any coil specification. Ideal for theatre and other lighting jobs—and for the switching of heavy motor loads.

Made to handle up to 460 volts A.C. or 440 volts D.C.

Uninsulated or with bakelite insulation—with or without lead wires.

COMPARE THIS DATA

LOAD RATING	60 AMP.	100 AMP.
Coil Power, Watts 115V60	3	7.8
Contact Resistance (Ohms)	.002	.001
Coil Resistance (Ohms) 115V60	970	185
Operate time (seconds)	.05	.05
Release time (seconds)	.07	.08

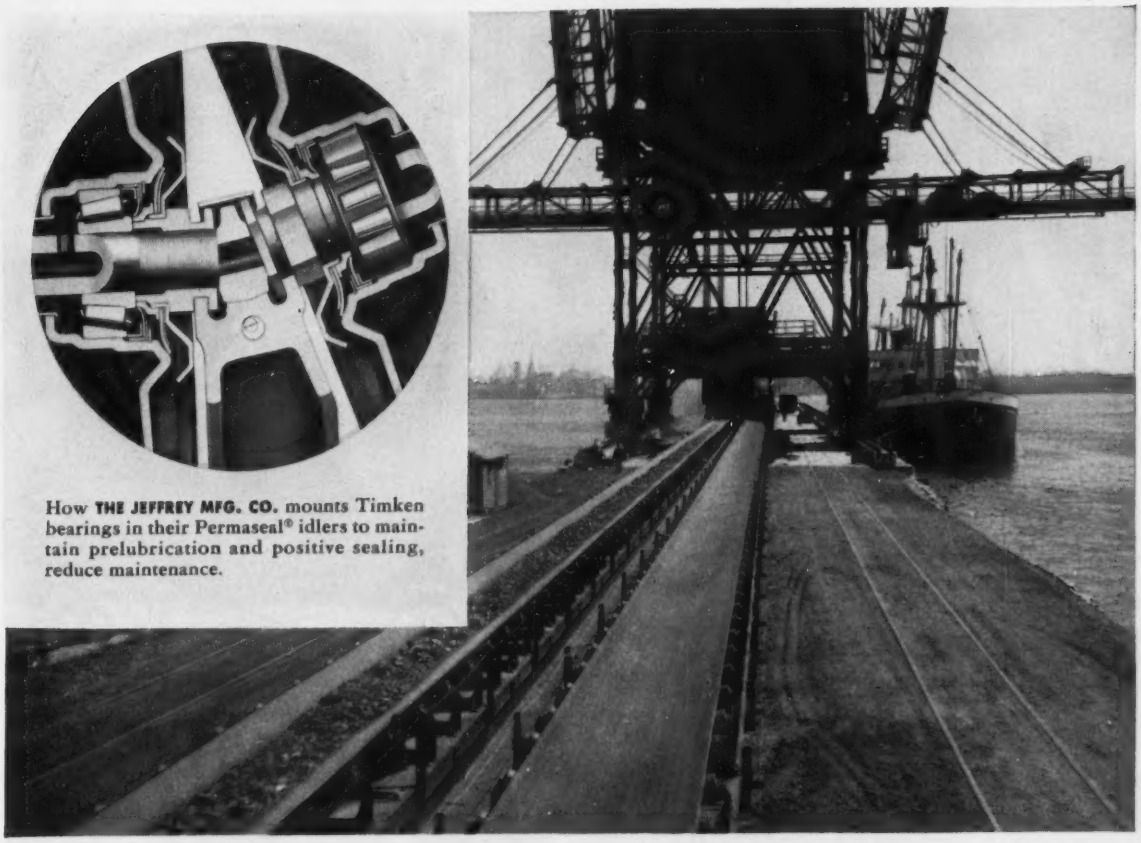


Write for Bulletins D-73 and D-75 or see Sweets Elect. catalog, Section 5B

- 4747 Bronx Blvd., New York 70
- 1969 Avenue Rd., Toronto 12
- 301 Fifth Avenue So., Minneapolis 15
- P. O. Box 1352 Postal Station O, Montreal

Durakool®
ELKHART, INDIANA

How **THE JEFFREY MFG. CO.** mounts Timken bearings in their Permaseal® idlers to maintain prelubrication and positive sealing, reduce maintenance.



Conveyor belt moves materials at less cost with Timken® bearings rolling the load

THIS huge conveyor belt does a whale of a job moving materials speedily and economically at these ore docks in Philadelphia. And to keep 'em rolling at lowest cost, the conveyor belt is supported by Jeffrey Permaseal® idlers with Timken® tapered roller bearings. This type of conveyor handles ore, coal, lime, over-burden, salt and gypsum. Timken bearings on these applications assure minimum maintenance, long bearing life because:

1) *They hold shafts concentric with housings,* making idler seals more effective in keeping dirt out, lubricant in.

2) *The tapered construction* of Timken bearings lets them take radial and thrust loads in *any* combination.

3) *Full line contact* between rollers and races gives Timken bearings *extra* load-carrying capacity.

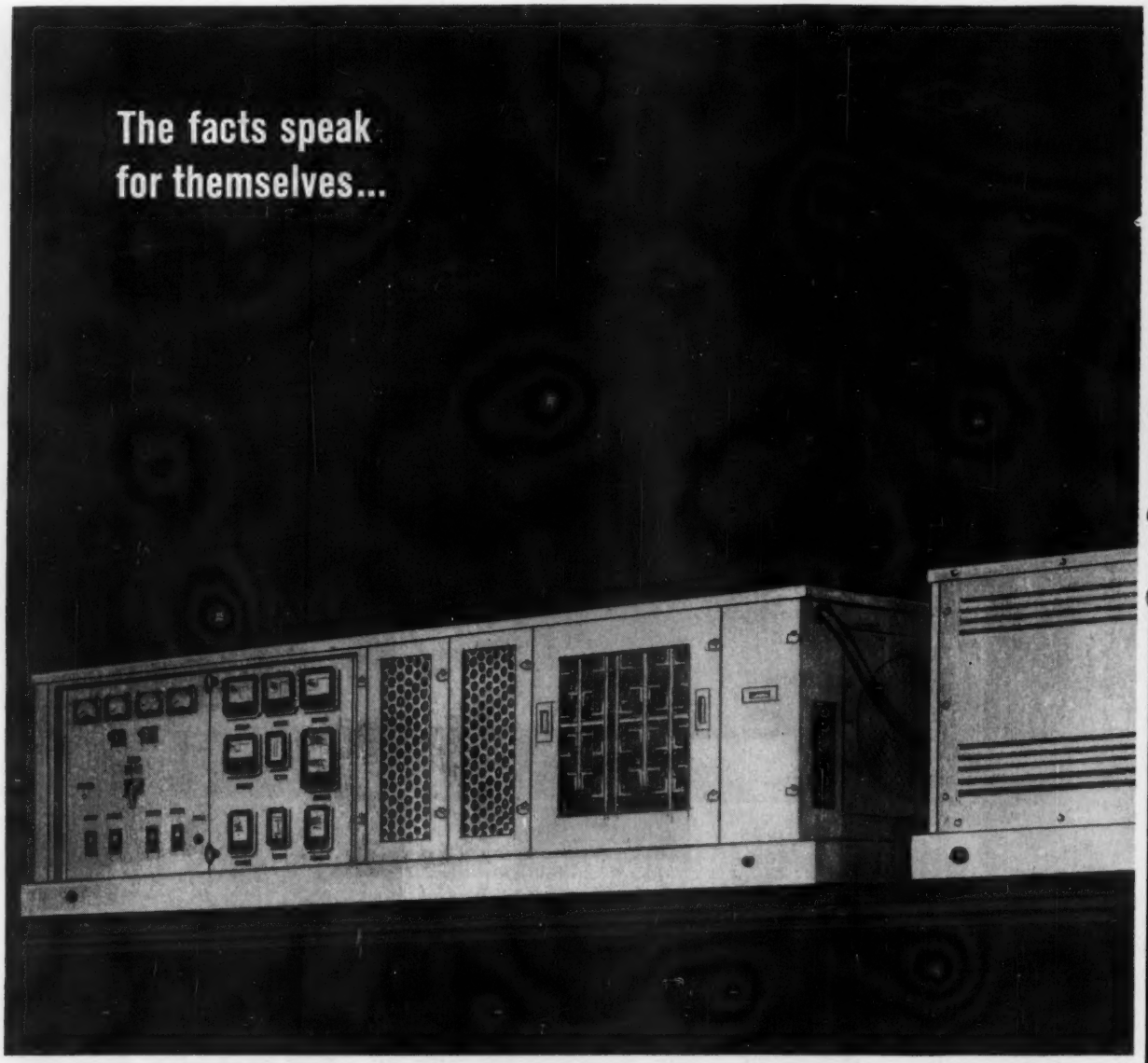
4) *And Timken bearings are made of the finest bearing-quality alloy steel available.*

The Timken bearing is the only tapered roller bearing proved by 40 years of service in heavy-duty conveyors using the popular dead shaft construction. For better performance at lower cost, be sure the machines you buy or build are equipped with Timken tapered roller bearings. ***When you buy Timken bearings you get . . .*** *1) Quality you can take for granted. 2) Service you can't get anywhere else. 3) The best-known name in bearings. 4) Pace setter in lower bearing costs.* The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits. Canadian Division: Canadian Timken, St. Thomas, Ontario.

Industry rolls on

TIMKEN®

tapered roller bearings

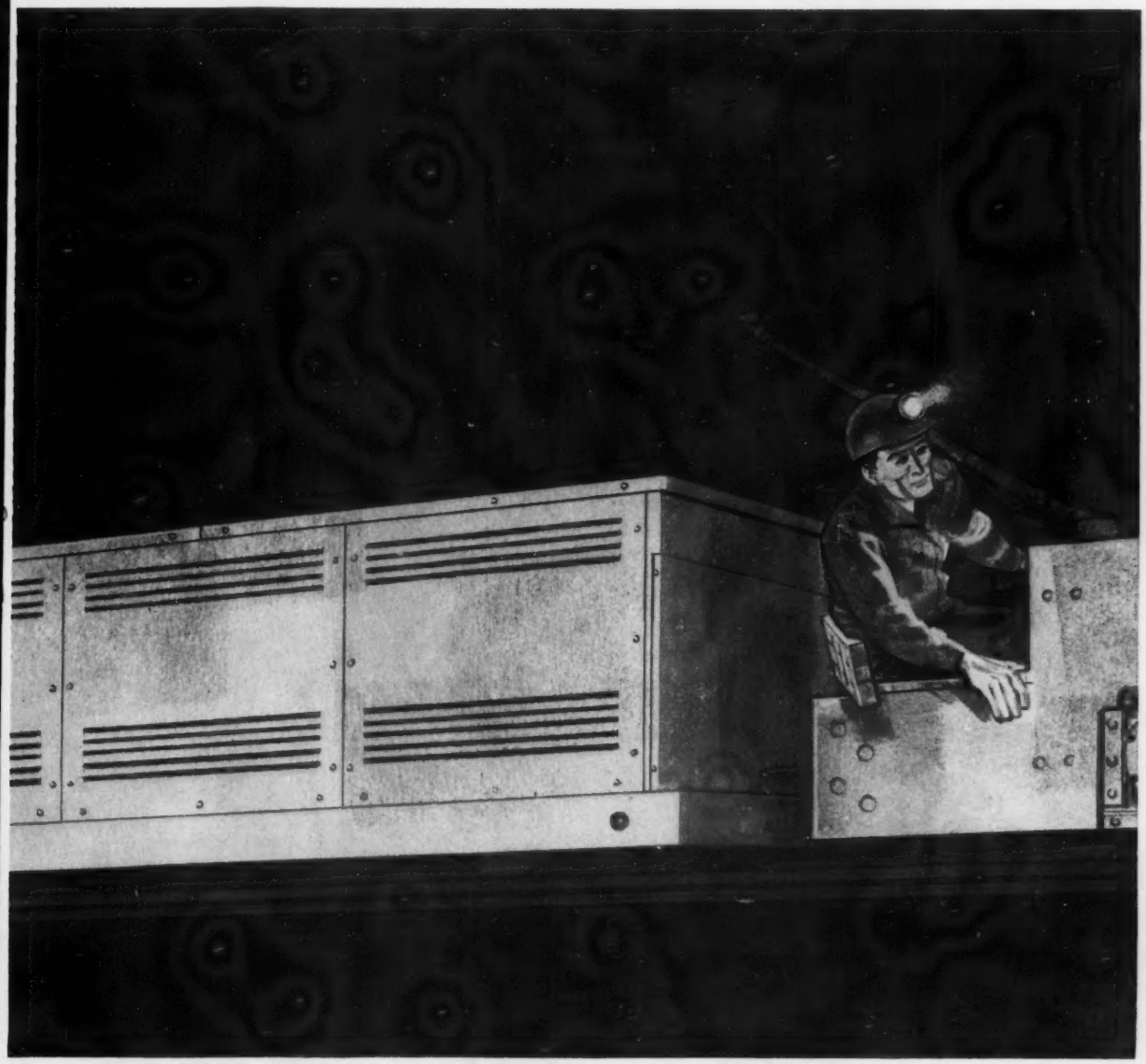


WESTINGHOUSE PORTABLE

as d-c power supplies
• cost less than
Ignitron rectifiers
• are more efficient
• are far shorter • need
far less maintenance

Early in 1957, Westinghouse proposed the first commercial use of silicon rectifiers for d-c conversion in mining.

Like the rest of the electrical industry at that time, Westinghouse was firmly committed to the Ignitron system. But intensive investigation had proved to us that silicon's superiorities could no longer be overlooked. Silicon provides a lower cost, more efficient and more compact rectifier, one that is more reliable—silicon cells don't age, so there's nothing to wear out. One that requires less maintenance

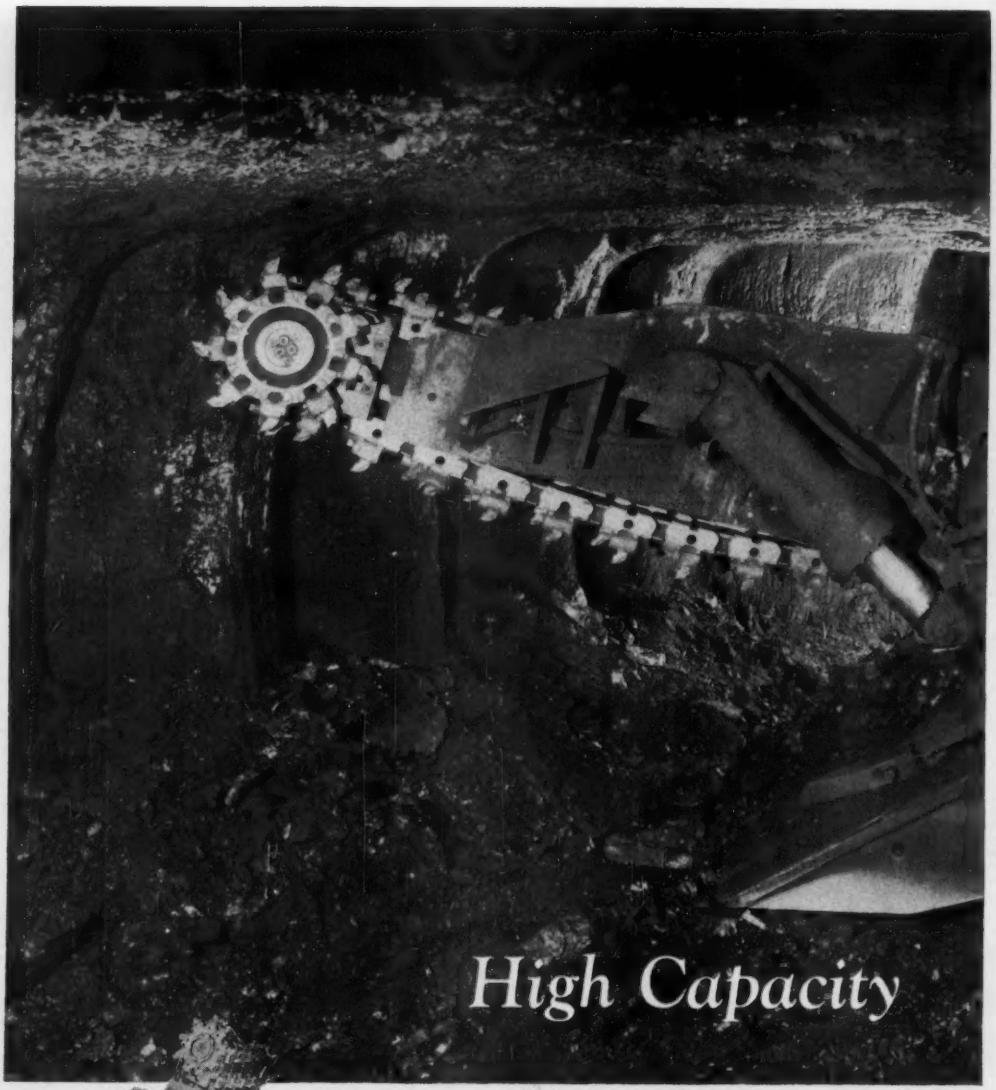


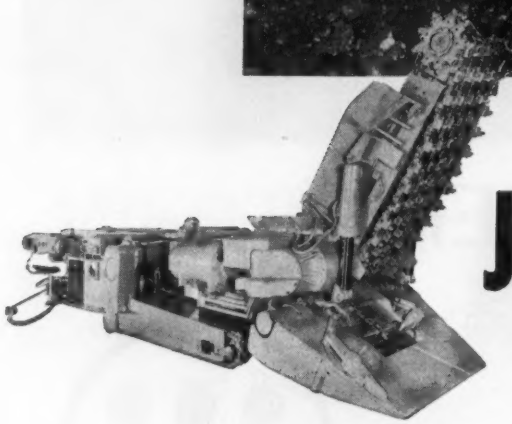
SILICON RECTIFIERS

—there are no complex excitation circuits, no vacuum tubes, no water cooling necessary.

Since 1957, Westinghouse has built a number of portable silicon rectifiers in ratings up to and including 750 kw. We shall be glad to send you the names of Westinghouse Silicon Rectifier users near you so you may ask them about their experience and opinions. For complete facts, call your Westinghouse representative, or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. You can be sure . . . if it's Westinghouse. J-15020

Westinghouse





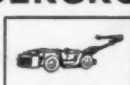
JOY 6-CM

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING MACHINERY

JOY

Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.

In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario


Coal Drills

Coal Loaders

Coal Cutters

Shuttle Cars

Continuous Miners

CONTINUOUS MINER

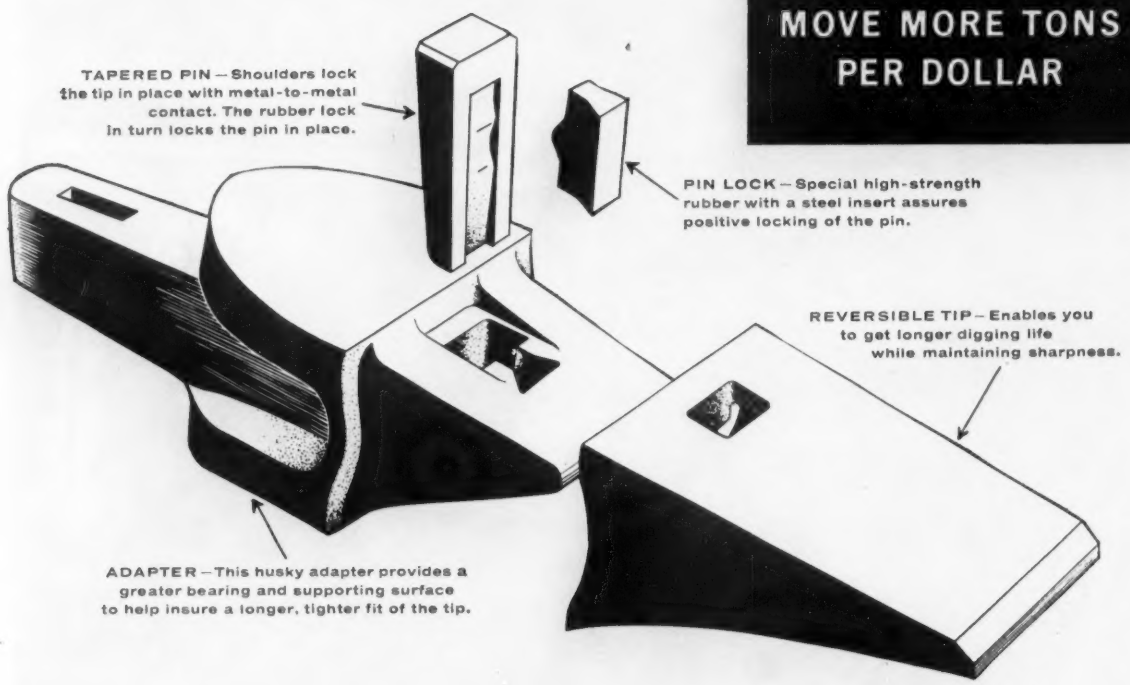
The Joy 6-CM is the most *flexible* high tonnage miner on the market. Rated at 5 to 5½ tons per minute, the 6-CM will mine rooms 12 to 22 ft. wide without adjustment, *or repositioning the machine.* Using a standard 7 ft. ripper bar, the 6-CM can mine any seam from 5½ to 10 ft. high without changing or adjusting parts. It can cut 7 inches below the floor line. That's flexibility. The machine can be furnished with twin roof bolting drills. Because the 6-CM works from a stationary position, mining is not interrupted during bolting.

The 42-inch wide ripper bar sumps 24 inches into the coal, mining more coal with every cut. A fast, gathering arm cleanup, and the wide conveyor are each powered independently of the ripper head . . . the 6-CM can do auxiliary cleanup while the shuttle cars are changing. The coal is stored on the conveyor for immediate unloading.

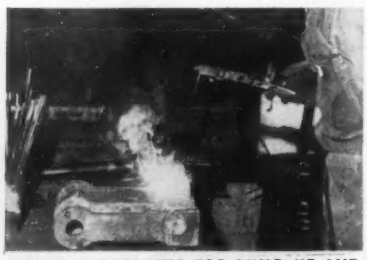
The 6-CM has two-speed tramming, 85 and 45 feet per minute. Crawler treads 16 in. wide make it sure-footed, even on grades and soft bottom.

The mining speed and flexibility makes the 6-CM a top performer in seams of 66″ and higher. Rugged construction, with extra strength where experience has shown that it is needed, keeps maintenance and down-time at a minimum. Talk to your Joy engineer about it. He has complete data.

AMSCO HELPS YOU MOVE MORE TONS PER DOLLAR


TAPERED PIN—Shoulders lock the tip in place with metal-to-metal contact. The rubber lock in turn locks the pin in place.
PIN LOCK—Special high-strength rubber with a steel insert assures positive locking of the pin.
REVERSIBLE TIP—Enables you to get longer digging life while maintaining sharpness.
ADAPTER—This husky adapter provides a greater bearing and supporting surface to help insure a longer, tighter fit of the tip.

AMSCO CAST MANGANESE STEEL DIPPERS *Installed as original equipment on many leading makes of power shovels. Cast of manganese steel—"the toughest steel known"—a material which provides as much as a ten-to-one advantage in lasting power over other steels, under the abuse of severe impact and abrasion. Sizes from ¾ cu. yd. to 9 cu. yd. capacity.*



AMSCO HARDFACING FOR BUILD-UP AND REPAIR—*Add extra service life at low cost to dippers, dipper teeth, hammers, augers, etc. . . . with Amsco Hardfacing. Complete line of hardfacing electrodes available through your Amsco welding distributor. Or write us for condensed catalog and price list on "Amsco Hardfacing Alloys".*

AMSCO SIMPLEX 2-Part Dipper Tooth extends digging life stays sharp • easy to replace*

Now you can save hours of costly shovel downtime . . . by using this new Amsco Simplex 2-Part Tooth. Simplex tips are quickly reversible to give added tip life while retaining sharpness. And when teeth eventually become worn, just knock out the retaining pin and replace with a new tip.

Simplex adapters fit this new 2-part tooth to *any* Amsco dipper or backhoe. And because Amsco makes both dippers and dipper teeth, you can be sure of proper fit between the adapter and shovel lips.

Cast of a new alloy especially developed for this service, the Amsco Simplex design is backed by over 50 years of experience in producing dippers and dipper teeth for the most rugged digging conditions.

Ask your power shovel distributor to supply you with these extra-long-wearing Simplex 2-part teeth . . . now!

WRITE US for complete descriptive bulletin on Amsco Simplex teeth, giving information on sizes and types available. *Patent No. 2,904,908

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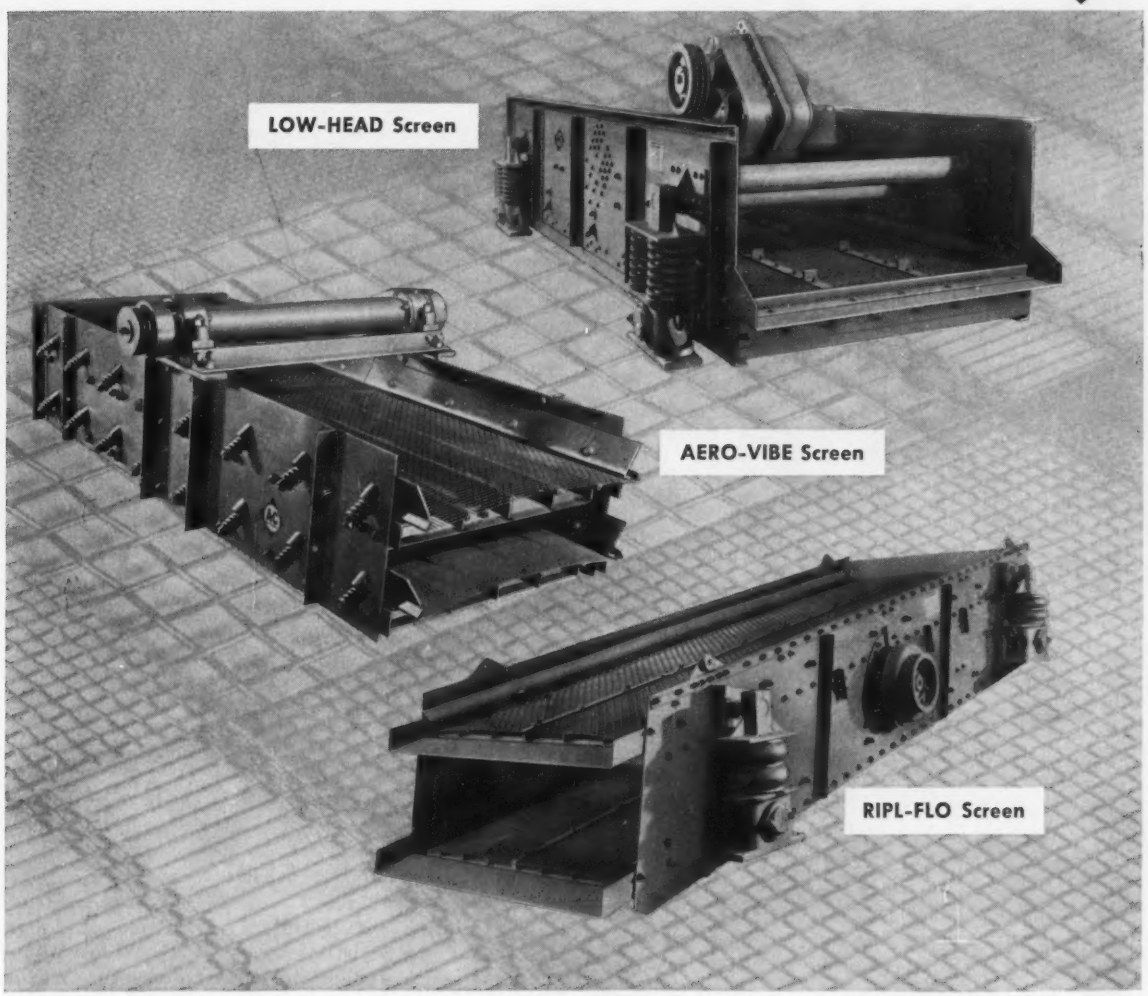

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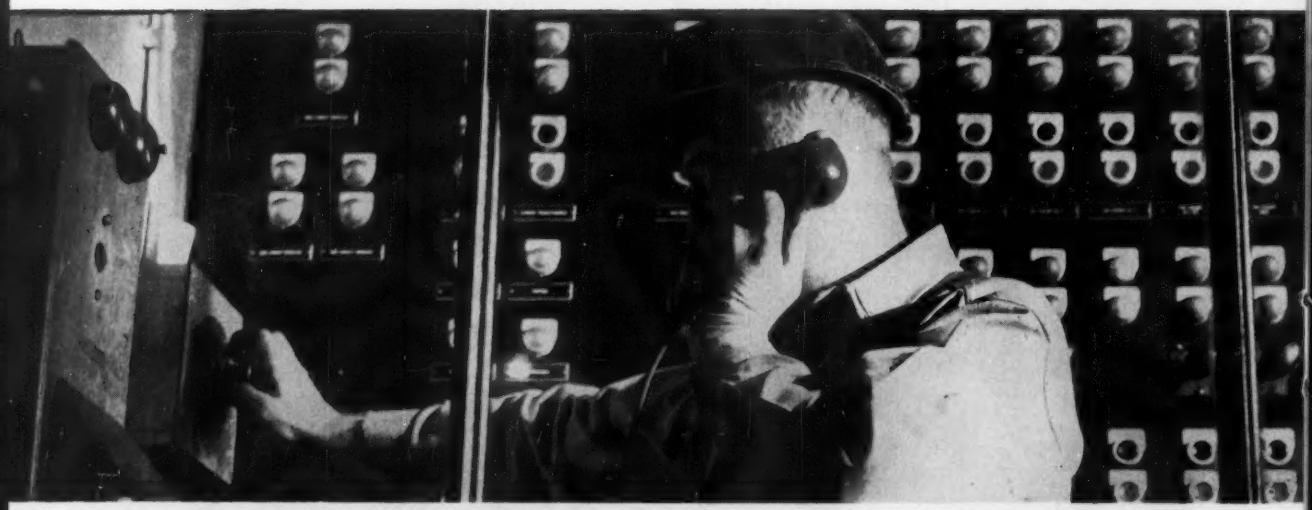
Our Editor Reports to



14,357 Bosses

Here at COAL AGE subscriber circulation is a key index of our editorial performance — just as your cost-per ton gauges operating efficiency at your mining property.

For we continue in business only as we successfully edit COAL AGE to serve the job interests and responsibilities of you, the subscriber. We purposely seek your subscription payment — though it pays only a portion of our publishing costs — because we believe it to be tangible evidence of your interest in what our editor and his staff have to say. Thus, by his power of decision, the subscriber is boss — that goes for each of the 14,357 progressive mine officials and supervisors, manufacturers' people and others who currently subscribe to COAL AGE.

To encourage independent evaluation of our circulation against industry-wide standards, COAL AGE became a charter member of the Audit Bureau of Circulations when it was founded as a non-profit, cooperative association 46 years ago this month.

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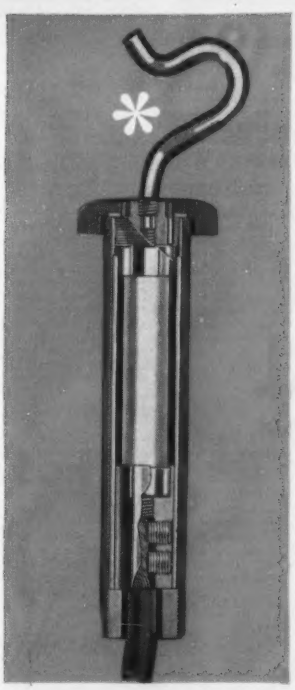

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1—Joy 14BU 7CE high pedestal loader.
4—Joy 14BU 3PE Loaders.
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2—Joy 8BU Loaders, 220 V. AC.
1—Joy curved Bar Head for 14BU, complete.
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2—Joy 32E10 Shuttle Cars, rebuilt.
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4—Joy 32E16 Shuttle Cars, rebuilt.
10—Joy 42E16 Shuttle Cars, rebuilt.
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6—Joy T-2-5 low pan Crawler Trucks, rebuilt.
1—Joy T-2-6 low pan Crawler Truck with reel.
2—Joy T-1, Standard Crawler Trucks, 220 AC.
1—Joy T-1 Standard Crawler Truck, 250 DC.
4—Joy 11-B Cutting Mach., like new, 35 & 50 H.P.
1—Joy 7-B Cutting Machine, like new, 250 V. DC.
2—Goodman 212 Cutting Machines, 19″ high.
1—Goodman 312 Cutting Machines, 17″ high.
3—Goodman 412 Cutting Machines, 19″ high.
1—Goodman Machine on Crawler, 31″ high. All hydraulic.
6—Goodman 512 Machines with Bugdusters.
6—Goodman 612 Cutting Machines, 250 and 500 volt.
1—Jeffrey 70 URB rubber tired Cutter, Universal head, perfect condition.
1—Goodman 2410 Rubber Tired Cutter, Universal head, like new.
3—Joy 11RU Rubber Tired Cutters with bugdusters, Universal heads, dual tires, like new. 250 V. D.C.
2—Joy 10RU Rubber Tired Cutters, Universal head, 220/440 V. A.C. Perfect.
4—Joy 10RU Rubber Tired Cutters, Universal head, 250 V. D.C.
6—7AU's on track. Universal head.
2—Jeffrey 29UC Cutting Machines, Universal head, cuts anywhere in seam, 38″ high, on Crawlers, 250 volt D.C.
1—Jeffrey 29LC on Crawlers, rebuilt.

LOCOMOTIVES

1—Goodman 6 ton, 93-A, 27″ high, armor plate frame.
1—Jeffrey 15 ton MH-77 Locomotive, armor plate frame.
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12—Jeffrey, 6 ton, type MH-88, 42″, 44″ and 48″ ga.
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2—Goodman, type 33, 6 ton, 44″ and 48″ ga.
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8—Jeffrey MH-78 Locomotive Units, cheap.
4—Jeffrey MH-88 Locomotive Units, real bargains.
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Locomotive Trucks & Spare Armatures for the above.

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1—Robins Car Shakeout.
20—Crushers, various sizes—Jeffrey, McLanahan & McNally.
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5—Truck Scales, 25 to 40 ton, late type.
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CUTTING MACHINES

2—Joy 10RU Rubber Tired Cutters, Universal head 220/440 volt A.C. Perfect.
4—Joy 10RU Rubber Tired Cutters, Universal head, 250 V. D.C.
3—Joy 11RU Rubber Tired Cutters. 250 V. D.C.
1—Goodman 2410 Rubber Tired Cutter, Universal head, new 1956. Excellent.
2—Jeffrey 29UC Universal Machines on Crawlers.
1—Goodman on Crawlers, 31″ overall height.
3—Baby Goodman 212's, rebuilt, 250 V. D.C.
7—Goodman 212 Cutting Machines, 19″ high.
4—Goodman 312 Cutting Machines, 17″ high.
3—Goodman 412 Cutting Machines, 19″ high.
6—Goodman 512's, with Bugdusters, like new.
4—Goodman 512's, rebuilt, or as removed from service.
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3—Goodman 112's, 220/440 V. A.C.
1—Joy 7-B Cutting Machine, 250 V. D.C.
4—Joy 11B Cutting Machines, rebuilt, 35 & 50 H.P.
6—7AU's, on track, Universal head.
10—Goodman 12AA's and 112AA's, 250 V. D.C.
2—Goodman 324 Slabbers.
2—Goodman 724 Slabbers.
2—Goodman 824 Slabbers.
6—Jeffrey 35L's, like new, 250 V. DC. 17″ high.
2—Jeffrey 35L's, on low vein trucks.
2—Jeffrey 35L's 220/440 A.C.
3—Jeffrey 35BB's, 220/440 A.C.
15—Jeffrey 35B's and 35BB's 250 V. D.C.
2—Jeffrey 29B's on track.
10—Jeffrey 29C's, track mounted.
2—Jeffrey 29L's, on Crawlers. Excellent.
1—Sullivan CE7, 220/440 V. A.C.

CONVEYORS

1—Robins 36″ tandem drive, with or without structure.
2—Jeffrey 52-B tandem drive 30″ Belt Conveyors, 1,500′.
1—Jeffrey 52-B tandem drive 36″ Belt Conveyor.
1—Joy 30″ Underground Belt Conveyor. Excellent.
1—Goodman 97-C, 30″ tandem drive.
1—Goodman 97-C, 26″ Conveyor, 1,000′ long.
1,200′ Robins 36″ Underground Structure, like new.
1,000′ Conveyor Belt, 42″.
2,000′ Conveyor Belt, 36″.
3,000′ Conveyor Belt, 30″.
4,000′ Conveyor Belt, 26″.
8—Jeffrey 61AM 12″ Chain Conveyors, 300′.
2—61EW Elevating Conveyors.
2—61WH 15″ Room Conveyors, 300′.
2—Joy 15″ Room Conveyors, 300′.
2—Joy 20″ Conveyors, 300′.
4—Joy Ladel UN-17 Shakers.
10—Goodman G-12½ and G-15 Shakers.
1,000′ Goodman 18″ Flat Belt Conveyors, tandem drive any length. Perfect.

CONVERTERS AND DIESEL PLANTS

1—300KW Portable Restifier, 3 car unit, excellent.
2—500KW G.E. Stationary Rectifiers.
4—1,000KW Stationary Rectifiers.
2—100KW, G.E. TCC-6's, 275 V., Rotary Converter.
1—150KW, G.E. HCC-6, 275 V., Rotary Converters.
1—150KW, 6 phase, Allis-Chalmers Rotary Converter, 275 V. D.C.
2—200KW G.E. HCC-6's, Rotary Converters, 275 V. D.C. Steel frames. Newly rewound.
3—300KW G.E. HCC-6's, Rotary Converters, 275 V. D.C. Like New.
2—300KW Westinghouse, 6 phase, Rotary Converters, 275 V. D.C.
2—500KW West. Rotary Converters, 275 V. D.C. Perfect.
2—200KW Westinghouse Rotary Converters, 275 V. D.C. Newly rewound.
(All the above with 6900/13000 and/or 2300/4000 primary transformers)
2—100KW MG Sets, 275 V. D.C.
2—150KW MG Sets, G.E. and West., 275 V. D.C.
1—200KW MG Set, rebuilt, 275 V. D.C.
1—200KW MG Set, G.E., perfect, 275 V. D.C.
2—300KW G.E. MG Sets, like new.
1—300KW Westinghouse, 600 volt MG Set, rebuilt
2—300KW Westinghouse, 600 volt, 6 phase, Rotary Converters.
2—500KW Westinghouse, 600 volt, D.C., 6 phase, Rotary Converters.
2—500KW HCC-6's, Rotary Converters, 6 phase, 600 V. D.C.
1—GMC-471 Diesel with 60KW, 250 V. D.C. Gen.
2—GMC-671 Diesels with 75KW, 250 V. D.C. Gen.
1—Cummins 125KW Diesel with 250 V. D.C. Gen.
1—Allis-Chalmers Natural Gas Engine with 100KW Generator, 275 V. D.C.
Boilers, like new, 500 H.P.

LOADING MACHINES

16—Joy Loaders, 14BU, 12BU, 8BU, 11BU, 20BU.
5—Joy 12BU9E Loaders, 220/440 V. A.C. Excellent.
3—Joy 12BU9E Loaders, latest type.
2—Joy 12BU with Piggyback Conveyors.
2—Goodman 865 Loaders, 26″, on Crawlers.
1—Goodman 665 Loader, on Crawlers, rebuilt.
2—Goodman 660 Loaders, 440 V. A.C., perfect.
1—Goodman 660 Loader, on Crawlers, 250 V. D.C.
1—Goodman 460, on track, rebuilt, all hydraulic.
2—Jeffrey 61 CLR's on rubber, 26″.
3—Jeffrey L-500 Loaders.
2—Myers Whaley, No. 3 Automatic Loaders.
2—Clarkson Loaders, 26″ above rail.

MISCELLANEOUS

1—Complete Five Track Tipple with Washers and Air Tables.
5—Complete Tipples, 3 to 5 Track. Wood and Steel.
Steel trestles for drop bottom cars.
All Steel Armco Buildings.
20—Jeffrey Motveyors on rubber tires.
1—¾ Yard Shovel and Back-Hoe.
1—¾ Yard Crawler Crane.
Battery Supply Tractors, Rubber Tired.
1—Cantrell Air Compressor on rubber tires.
10—Air Compressors, 1 H.P. to 40 H.P.
2—Joy self-propelled rubber tired comp., 240 cu. ft.
2—Acme self-propelled rubber tired compressors, 130 cu. ft.
40—Mine Pumps, all types.
1—Different'al 40 passenger Man-Trip Car.
6—MSA Rock Dusters.
2—Phillips Carriers, 44″ and 48″ ga.
1—Barber-Greene self-propelled Bucket Elevator.
Pipe, Plastic, Steel, Transit, all sizes 1″ to 6″.
300—Mine Cars, drop bottom, 42″ ga.
90—Mine Cars, drop bottom, 44″ ga.
50—Mine Cars, drop bottom, 48″ ga.
100—Mine Cars, 18″ high, end dump, 44″ ga.
300—Mine Cars, end dump and drop bottom, 20″ high, 48″ ga.
1—10 ton Mine Car Scale with Recorder.
51—Brown Fayro HKL and HG Car Spotters.
1—Brown Fayro Hydraulic Car Spotter.
1—12 ton Differential Slate Larry.
Incline Hoists, 25 to 50 H.P.
1—Jeffrey 5′ Aerodyne Fan, like new.
1—Jeffrey 6′ Aerodyne Fan.
2—Storage Tanks, 4,000 Gallons.
2—Storage Tanks, 10,000 Gallons.
10,000 Five Gallon G.I. Cans, screw lids.
2,500 tons Relaying Rail, 25lb., 30lb., 40lb., 50lb., 60lb., 70lb.
30 Tons Copper—4/0 and 9 Section Trolley 1/0, 2/0, 4/0 Stranded.
Thousands of feet of rubber covered three conductor cable. All sizes.
300—Transformers from 1 to 300 KVA, 110 to 13,000 primary volts.
400—Electric Motors, 3 to 250 H.P.
Huge Stock of Mine Supplies.
600—MSA Mine Lamps, Chargers, etc.
4—Mine Scales, 10 & 20 ton.
5 Truck Scales, 25 to 40 ton, late type.
Mack & International tandem dump trucks.
THOUSANDS OF OTHER ITEMS

WE BUY—SELL—TRADE

J. T. FISH

PHONE PL 2-4400

LOGAN, WEST VA.

MOUNTAIN STATE EQUIPMENT COMPANY

HAS PURCHASED THE ST. ELLEN MINE OF PEABODY COAL COMPANY, O'FALLON, ILLINOIS, LOCATED ON U. S. ROUTE 50, APPROXIMATELY FIFTEEN MILES EAST OF ST. LOUIS, MISSOURI. THE ENTIRE STOCK OF EQUIPMENT AND APPROXIMATELY 400 ACRES OF LAND ARE BEING OFFERED FOR SALE AT BARGAIN PRICES.

J. J. MAHONEY AND ROY FAIRCHILD CAN BE CONTACTED AT MINE SITE AT ALL TIMES.

P. O. Box 150
O'Fallon
Illinois

Phone: MErcury 2-3621
MErcury 2-3622
MErcury 2-3623
Night Phone: MErcury 2-5887

THE FOLLOWING IS A PARTIAL LISTING OF EQUIPMENT FOR SALE AT THE MINE SITE

Shuttle Cars, 250 Volts DC
11—Joy 10SC Shuttle Cars, right and left hand drive.
3—Joy 42-D Battery Shuttle Cars complete with batteries and chargers.

Cutting Machines, 250 Volts DC
5—10RU Joy Cutting Machines
5—324 AA Goodman Slabbers—Track Gauge 42"

Trolley Locomotives, 42" Track Gauge for 250 Volts DC
2—Goodman 20 ton 81A-42-108T with 3—120 H.P. Motors, completely modern.
1—13 ton Goodman — Type 81A04T, completely modern.
1—Goodman 13 ton 136B-0-4-6 with 2—75 H.P. Motors.
2—13 ton Jeffrey Locomotives, (1—inside frame and 1—outside frame)
1—Goodman 5 ton 3013 with 1—50 H.P. Motor.
4—8 ton 132AK42-48R Goodman with 2—50 H.P. Motors with reels.
1—8 ton 32-0-4-T Goodman with 2—50 H.P. Motors with reels.
1—8 ton LM2-8-T.DD General Electric with 2—50 H.P. Motors with reel.
3—6 ton LM2-T-6MM General Electric with 2—35 H.P. Motors with reel.
2—6 ton LM2-4-6-11 General Electric with 2—35 H.P. Motors with reel.

BATTERY LOCOMOTIVES, 42" Track Gauge
18—Greensburg Monitors complete with charging equipment and batteries.
8—Mancha Locomotives complete with charging equipment and batteries.

Loading Machines, 250 Volts DC
9—11BU Joy Loading Machines, completely modern with separate pump motors.
6—360 Goodman Loading Machines.

Motor Generator Sets
8—General Electric 300 KW Motor Generator Set, 1200 RPM, primary voltage 2300/4160, 275 Volts DC Complete with panel boards.
5—General Electric 200 KW Motor Generator Sets. 1200 RPM, 2300/4160 primary voltage, 275 primary voltage 2300/4160, 1200 RPM, 275 Volts DC Complete with panel boards.
3—Westinghouse 200 KW Motor Generator Sets, 1200 RPM, 2300/4160 primary voltage, 275 Volts DC, complete with panel boards.
3—Westinghouse 150 KW Motor Generator Sets, 1200 RPM, 2300/4160 primary voltage, 275 Volts DC, complete with panel boards.

Conveyors
5—Joy PL 11 Elevating Conveyors
6—Joy PL 11 Side Dumps

Belt Conveyors
1—Hewitt Robins Slope Conveyor, 980 ft. long, 42" wide, equipped with 200 H.P., 440 Volt AC Drive (also 50 H.P. Volt AC Motor for man trip), complete with 42" x 6 ply Rubber Conveyor Belt, Ajax Raynile #130¼" top cover and 1/16" bottom cover with Nylon Breaker.
3,128 feet of Jeffrey 36" wide structure in 8 ft. sections.
2,296 feet of Joy 36" wide structure in 8 ft. sections.
10,848 feet of Rubber Belt 36" wide
3—40 H.P. Goodman 36" Belt Drives with Tail, 250 Volts DC.
1—Robins Belt Conveyor 36" wide, 150 ft. long complete with Allis Chalmers, 30 H.P., 220/440 Volt AC Drive.

MINE CARS
100—AC&F, Three-Door Drop Bottom Mine Cars. 48" High, 17 ft. 7¼ in. overall length, capacity 271 cubic feet level full. 42" gauge.
100—Sanford Day Three-Door Drop Bottom Mine Cars, 36" High with an 8" sideboard, 16 ft. 10½" overall length, 42" gauge.

WIRE MATERIAL
21,400 ft.—4/0 Round Return Wire
8,600 ft.—500,000 CM
50,000 ft.—1,000,000 CM
82,600 ft.—6/0 Trolley Wire
8,000 ft.—4/0 Rubber Covered 4000 Volt Feeder Cable.

TRACK MATERIAL
64,800 ft.—40# Track
154—40# Switches
10,800—40# Ties
100,400 ft.—60# Track
51—60# Switches
7,000—60# Ties

COMPLETE FOUR-TRACK TIPPLE CAPABLE OF HANDLING 10,000 TONS OF COAL PER DAY
Partial List of Major Items of Tipple:
Sizes of coal: from ¼ x 0 to 7 x 4" Block
CMI 48" Dryer—complete with motors, drives, belt, etc. screen cloth 1/16" opening, capacity 90 ton per hour.
1—Coppus Ventair Blower #24708.
Pulverizers: (American Pulverizers) 4—#305, Ser. #3218—AC3, Serial #1798, AC3B, Ser. #3127. WC-24, Ser. #3240.
5—8x6 Allis-Chalmers Centrifugal Pumps, complete with motors (4) breakers.
1—16x14 Allis-Chalmers Centrifugal Pump, complete with motor, starter, breakers.
1—Roberts & Schafer Eleptic Vibrator.
Consists of Belt & Chain Conveyors complete with motors, drives. 36" Belt also some 24x30" Belt.
1—Roberts & Schafer Air Drying Plant (specifications furnished on request)

WELDERS
3—Lincoln, 300 amp. M.G. Sets
2—Hobart 300 Amp. M.G. Sets
1—G.E. 400 amp. M.G. Set
4—Guyan 200 amp. Resistance Welders

AUTOMATIC RECLOSING BREAKERS
4—1600 amp. I.T.E. Modern with reverse current relay.

AIRDOX EQUIPMENT
5—Armstrong 60 H.P., AC 440 Volt Compressors
5—Armstrong Coal Breakers, Model EB-301.
5—G. E. Motors 60 H.P. Type K, Frame 504, 220/440 Volt AC, 1180 RPM.
Auxilary equipment and controls complete with 16,100 feet of Airdox Pipe.

PORTAFEEDER
1—Nolan Portafeeder.

COAL DRILLS
5—Manson Trucks—10 H.P., DC Tram Motors on 4, 7½ H.P. DC Tram Motors on 1, Joy 9 J Motor with Reduction on 1. Each drill truck has 2 drill arms with 2 Chicago Pneumatic 580 Drills 7½ H.P., DC.
3—Manson Track Trucks, each truck with 2 drill arms & 2,580 Drills.
2—Manson Track Trucks, without drills.
9—Dooley Rubber Tired Drill Trucks, equipped with two arms and two 580 drill motors.

ROOF DRILLS
1—Joy RBD-7 with 15 HP Reliance Permissible DC and mounted on Manson with 7½ H.P. Westinghouse on Rubber.
1—Jeffrey 56 R.D. with 15 H.P. Motor DC, arm is mounted on Manson Track Truck.
1—Dooley (Rubber Tired) Drill Truck, equipped with Vertical Drilling 580 Drill Motors.

ROCK DUSTERS
1—American Mine Door Road Cleaner
2—MSA Rock Dusters, 25 H.P. Track
3—MSA Bantam Rock Dusters, 2 H.P.

TRUCKS
4—(Shop Built) Mobile Repair Trucks
4—Personnel Jeeps, 42" Track Gauge.

FANS
1—Jeffrey Aerodyne Fan, Serial No. 8687 complete with G. E. 100 H.P. 440 Volt AC Motor and Auxiliary Ford Industrial Power Unit gasoline driven.
1—4 ft. Jeffrey Aerodyne Fan complete with 60 H.P. 220/440 Volt AC Motor and Auxiliary Ford Industrial Power Unit gasoline driven, complete with all necessary equipment and controls.

TRANSFORMERS
3—2400/4160 Y, 240-480 Volts, 100 KVA General Electric Single Phase Transformers.
3—2400/4160 Y, 240-480 Volts, 333 KVA General Electric Single Phase Transformers.
3—2300/4160 Y, 230-115 Volts, 200 KVA General Electric Single Phase Transformers.
3—2300/115/230 Volt, 15 KVA General Electric Single Phase Transformers.
3—50 KVA, 2300/4160 Y, 240/480 Volt General Electric Single Phase Transformers.

SUPPLY HOUSE
Complete inventory of new parts for 10SC, 10RU and 11BU Joy Equipment plus cable, tools, hardware, etc. for operation of mine.

BATHHOUSE EQUIPMENT
355—Baskets with Chains, 20 shower heads and complete equipment for operation of bathhouse.

LAMP HOUSE
360—R4 Cap Lamps complete with necessary charging equipment.
25—Flame Safety Lamps

MOBILE EQUIPMENT
1—Koehring Heavy Duty Crane—C5521.
1—Shovel Dipper Stock for same—Size 301, Serial No. 61, Length 16 feet—¾ yard dipper
1—Haiss Field Loader, Model 75WSBC, Serial No. 726, 11'6" Conveyor, Serial No. K8644.
1—International 1950 Flat Bed Truck Tandem with steel bed and wench, Ser. #3438, 3 axles, weight 18,500 lbs.
1—Haugh Pay Loader, Model HF and HFH, Serial No. 81221
1—Allis Chalmers Tractor HD9-B27
1—Allis Chalmers Tractor Hi Lift, Model HD5, Model #24-27482, Serial No. 22246.
1—Caterpillar Tractor D6, 60" Gauge, Serial No. 5R4778.
1—Whiting Track Mobile, Serial #TM-209.
1—Roller—W. M. Bros. Boiler Mfg. Co., Model 678, Ser. #RR-2734, weight 3950 lbs.

COMPLETE SHOP AND OFFICE EQUIPMENT
STATIONARY MOTORS
AC and DC Motors ranging from 1 to 300 H.P.

GENERAL MISCELLANEOUS
Hundreds of other items such as pump, motors, armatures, locomotive trucks, wheel units, hydraulic pumps, conveyor chains, cat chains, tipple drag lines too numerous to list.

MOUNTAIN STATE EQUIPMENT COMPANY

Box 1050, Beckley, West Virginia **Phone CLifford 3-7383**

J. J. MAHONEY
Res. Phone CLifford 3-6804, Beckley

WILLIAM R. MONK
Res. Phone CLifford 3-6907, Beckley

R. E. KAMM
Res. Phone 4281, Summersville

ELECTRIC AND MACHINE SUPPLY COMPANY

Largest Supplier of the Best Rebuilt Mining Equipment

CONTINUOUS MINERS
1—3 JCM Joy Continuous Miner, 250 V., D.C., Excellent Condition
1—Lee Norse Jr. Continuous Miner, 250 V., D.C.

CUTTING MACHINES
5—12RB Joy Cutting Machines, 250 V. D.C., Permissible, Dual Wheels, Bug Dusters, 9' Bar, Excellent Condition
5—11RU Joy Cutting Machines, 250 V. D.C., Permissible, Bug Dusters, one completely rebuilt
1—70 URB Jeffrey Cutting Machine, 250 V. D.C., Excellent Condition
1—29U Jeffrey Cutting Machine, 220/440 V. A.C., Rebuilt
15—512 Goodman Cutting Machines, 250 V. D.C., Hydraulically or Manually Controlled
1—824 Goodman Slabber, 250 V. D.C.
50—35B and 35BB Jeffrey Cutting Machines, A.C. and D.C.
1—35L Cutting Machine
6—7AU Sullivan Cutting Machines, 250 V. D.C.
5—7B Sullivan Cutting Machines, 250 V. D.C.
16—11B Sullivan Cutting Machines, 35 & 50 h.p., 250 V. D.C.
19—12AB, 12AA and 112AA Goodman Cutting Machines, 250 V. D.C.
9—212AA Baby Goodman Cutting Machines, 250 V. D.C.

BELT CONVEYORS
1—36" Joy Model "C" Belt Conveyor, 1,080' centers
7—MTB 30 Joy Tandem Belt Conveyors, 1,000' centers, 25, 40 & 50 h.p., one with Scandura Flame Proof Belting
860'—48" Link Belt Belt Conveyor Structure
1—30" 97HC Goodman Tandem Belt Conveyor Drive
1—30" Shop Constructed Belt Conveyor Drive
288'—30" Barber Greene Belt Conveyor Structure
8,760'—26" Joy Model "C" Structure
18—26" Belt Conveyor Drives, various makes

LOADING MACHINES
3—11BU Joy Loaders, 250 V. D.C.
5—8BU Joy Loaders, A.C. & D.C., rebuilt
2—14BU-7RAE Joy Loaders, 250 V. D.C.
1—14BU-7BE Joy Loader, 250 V. D.C.
4—14BU-3PE Joy Loaders, 250 V. D.C.
7—14BU-2E Joy Loaders, 250 V. D.C., 28" O.H.
3—12BU-9E Joy Loaders, 250 V. D.C., rebuilt
4—20BU Joy Loaders, 250 V. D.C., Permissible
1—360 Goodman Loader, on rubber, 250 V. D.C.
5—Long 88 Pig Loaders, 250 V. D.C.
1—24BB Clarkson Loader, 250 V. D.C.

SHUTTLE CARS
8—60E-10 Joy Shuttle Cars, w/Elevators, matched pairs, 250 V. D.C.
10—42E Joy Shuttle Cars, 250 V. D.C.
5—5SC Joy Shuttle Cars, w/Elevators, 250 V. D.C.
19—6SC Joy Shuttle Cars, matched pairs, 250 V. D.C.
2—8SC Joy Shuttle Cars, Elevating Discharge, Permissible Plates, Excellent Condition, 250 V. D.C.
17—32E-10 & 32E-16 Joy Shuttle Cars, Excellent Condition, 250 V. D.C.
2—MT66-A45 Jeffrey Shuttle Cars, 250 V. D.C., matched pair, Excellent condition.

MISCELLANEOUS TRACKLESS EQUIPM'T
1—WK-83R Joy Compressor, 240 cu. ft.
1—WL-82 Joy Compressor, 125 cu. ft.
7—T2-5AE & T2-2E Joy Machine Trucks
2—T1-4G Joy Machine Trucks, 220 V. A.C.
1—Lot 9J, 10J, 23J & 24J Motors

PREPARATION EQUIPMENT
1—4 Cell Jeffrey Baum Jig Washer, complete, 300 t.p.h. capacity
1—Simon Carver Heavy Duty 2 compartment Baum Jig, 400 t.p.h. capacity
1—Daniels Heavy Media Washer
1—48" CMI Centrifugal Dryer, Excellent
1—Heat Dryer, complete
1—36" x 130' Hot Material Handling Belt, Excellent
4—7' x 15' Single Deck Diester Tables
1—36" x 36" Jeffrey Single Roll Crusher
1—36" x 33" Marion Double Roll Primary Crusher
1—30" x 36" Jeffrey Double Roll Crusher, Like New
1—30" x 30" Link Belt Double Roll Crusher
1—24" x 50" Pa. Single Roll Crusher
2—24" x 24" Jeffrey Single Roll Crushers
1—2' x 4' Williams Pulverizer
1—18" x 24" McClanahan Stone Single Roll Crusher
1—18" x 12" Jeffrey Swing Hammer Pulverizer
1—6' x 16' Allis Chalmers Double Deck Low Head Vibrator
1—6' x 14' Single Deck Allis Chalmers Low Head Vibrator, Like New
1—5' x 16' Triple Deck Allis Chalmers Ripl-Flo Vibrator, Like New
1—5' x 16' Single Deck Allis Chalmers Low Head Vibrator, Like New
2—5' x 12' Allis Chalmers Single Deck Low Head Vibrators
1—5' x 12' Allis Chalmers Ripl-Flo Double Deck Vibrator
1—5' x 10' Double Deck Robbins-Gyro Vibrator, Like New
1—4' x 12' Hewitt Robbins Vibrex Screen, Triple Deck
5—4' x 7' Jeffrey Traylor Double Deck Vibrators
2—4' x 7' Jeffrey Traylor Single Deck Vibrators
1—3' x 14' Single Deck Gyro Vibrator
2—3' x 8' Low Head Vibrators
1—30" x 72" Jeffrey Traylor Double Deck Vibrator
1—2' x 5' Lecco Single Deck Vibrator
1—2' x 5' Selectro Double Deck Vibrator
9—24" x 90" Jeffrey Traylor Vibrators, w/M.G. Sets
2—Magnetic Separators, Complete
1—Set Jeffrey Dewatering Screens
13—Scraper Conveyors of various sizes
14—Drag Conveyors of various sizes
1—970' Jeffrey Rope & Button Conveyor
13—Boom Hoists from 1 ton to 5 ton
We can construct loading booms and tipple belts in any size.

CHAIN AND SHAKER CONVEYORS
20" Joy Chain Conveyors, A.C. & D.C., Permissible
15" Joy Chain Conveyors, A.C. & D.C., Permissible
15" Long Chain Conveyors with 400 DBH Mobile Heads or Stationary Drives, A.C. & D.C.
12" & 15" Jeffrey Chain Conveyors
12" Goodman Chain Conveyors
PT12 Long Pigeyback Conveyors
PT12-B Long Piggyback Conveyors
Goodman G12½, G15 & G20 Shaker Conveyor Drives
Joy Ladel UN17 Shaker Conveyor Drives
Goodman Power Duckbill & Duckbill Hoists

LOCOMOTIVES
4—20 Ton Jeffrey MH77 Locomotives, 42" & 48" t.g.
1—15 Ton HM828 G.E. Locomotive, 90 h.p. units, 44" O.H., 48" t.g., Excellent
1—14 Ton MH110 Jeffrey, 42" t.g.
6—13 Ton Locomotives, 250 V., any gauge
1—12 Ton 29B Goodman Locomotives, 40" O.H.
11—10 Ton Locomotives, 250 V., any gauge
19—8 Ton Locomotives, 250 V., any gauge
8—7 Ton Atlas Battery Locomotives
1—6 Ton Battery Locomotive, New
29—6 Ton Locomotives, any gauge
3—6 Ton Jeffrey MH150 Locomotives
16—6 Ton MH88 Jeffrey Locomotives
9—5 Ton Locomotives, 250 V.
17—4 Ton Locomotives, 250 V., any gauge
1—4 Ton G.E. Battery Locomotive, 48" t.g.
2—4 Ton Mancha Battery Locomotives, 48" t.g.

SUB STATIONS & TRANSFORMERS
1—Westinghouse A.C. Sub Station, 4500 KVA, 6900/2300, complete w/boards, Excellent
4—300KW M.G. Sets
5—200KW M.G. Sets
4—200KW, HCC-6-1200 G.E. Rotary Converters, Automatic
4—150KW G.E. Rotary Converters, w/Transformers
1—150KW Westinghouse Rotary Converter, Completely Automatic
19—150KW M.G. Sets of various makes and voltages
2—100KW M.G. Sets
1—100KW Westinghouse Generator, 250 V. D.C., connected to Buda Diesel Engine, complete w/boards
2—100KW Generators, w/671 G.M. Diesel
1—100KW Generator w/UD1091 International Diesel
1—90KW Generator w/671 G.M. Diesel
1—75KW Generator w/10019 Diesel Engine
1—75KW Generator w/75 h.p. G.M. Diesel w/ITE Automatic Control Board
1—45 KVA Diesel Generator, 110/220 V., 1-3 phase
1—100KVA Gasoline Alternator Unit
1—50KW M.G. Set, 125 V. D.C., 1200 rpm
2—Armatures for 200 KW Rotary G.E., type HCC
2—600 & 800 Auto Transformers
199—Transformers from 1½ KVA to 800 KVA
1—45KVA A.C. Alternator, 220/440 V., Like New

MINE CARS
90—36" t.g. Drop Bottom Cars
155—42" t.g. End Dump Cars, various makes
176—42" t.g. S. D. Drop Bottom Mine Cars
45—42" t.g. A.C.F. Drop Bottom Cars
22—44" t.g. Drop Bottom Cars, 10 ton
130—44" t.g. Drop Bottom Cars, various sizes
333—44" t.g. End Dump Cars, various sizes
327—48" t.g. S. D. Drop Bottom Cars
259—48" t.g. A.C.F. Drop Bottom Cars
2—56½" t.g., 3 Ton, 4 Wheel Push Trucks (New)

RAIL AND WIRE
1,455—Tons 40, 45, 56, 65, 70, 80, 90 & 100 lb. Relaying Rail
325'—2,000,000 CM Bare Copper Feeder Cable
550'—1,000,000 CM Insulated Aluminum
650'—1,000,000 CM Bare Copper Feeder Cable
500'—350,000 CM Copper Feeder Cable, Insulated
2,000'—2/0 Stranded Copper, Bare
36,670'—2/0 Solid Copper Highline Wire
47,000'—1/0 Solid Copper Highline Wire
10,435'—#1 Solid Copper Highline Wire
10,945'—#2 Solid Copper Highline Wire
442'—#4 Solid Copper Highline Wire
3,700'—#6 Solid Copper Highline Wire
5,825'—4/0 Fig 8 Trolley Wire
56,000'—6/0 Trolley Wire
1,600'—9 Section Trolley Wire
5,000'—2/0, 3 Cond. Anhydrex & Lead Covered Transmission Cable
10,000'—#2, 3 Cond. Lead Covered Cable, 5,000 V.
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2—412 AA Goodman Machines.
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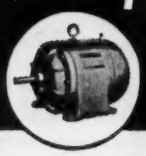

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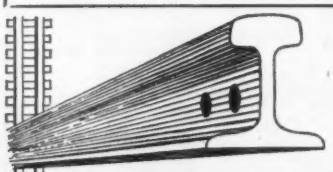

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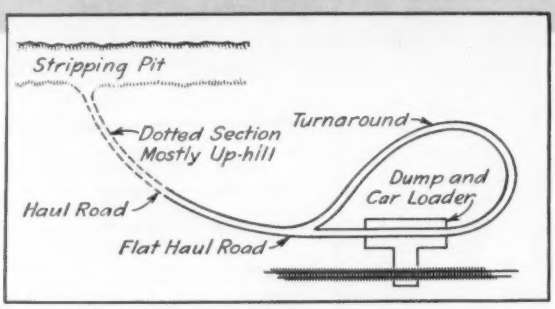
Pittsburgh 22 ..... Wm. H. H. Ginder, 4 Gateway Center, EXpress 1-1314
Philadelphia 3 .. W. A. Potter, 6 Penn Center Plaza, Philadelphia 3, Locust 8-4330
Portland 4 ..... Scott Hubbard, Pacific Building, CApital 3-5118
St. Louis 8 ..... F. W. Roets, Continental Bldg., 3615 Olive St., Jefferson 5-4867
San Francisco 4 .... J. W. Otterson, 68 Post St., Douglas 2-4600
Houston 25, Texas ..... F. E. Holland, Prudential Bldg., Room W-724, Holcombe Blvd., JAckson 6-1281

Europe:
United Kingdom ..... Norman Strick Hill House 95 Farringdon St., London E.C.4, Telephone CENTRAL 0911
Austria, Germany, Netherlands ... .. Stanley Kimes, 85 Westendstrasse, Frankfurt/Main, Germany, Telephone: 772665
Belgium, Luxemburg, France, Italy, Switzerland ..... Michael R. Zeynel, 2 Place du Port, Geneva, Switzerland

HURRY-UP HAULER!

One of three Cat DW20 Series G Tractors with PH20 Coal Haulers that help maintain high production at the Airline Mine, near Linton, Indiana



Owned by the Alva Coal Corporation, Jasonville, Indiana, the Airline Mine produces No. 5 coal. Three Caterpillar DW20 Series G Tractors with PH20 bottom dump wagons help haul the coal from pit to loader. As you can see by the sketch, much of the haul is uphill. Delivering 50 tons per load, each hauler averages 17-20 loads per shift, depending on the conditions of the haul road.

345 HP (max. output)—39,565 lb. (max. rimpull)

On that adverse grade, as well as on the flat, the increased horsepower and rimpull of the DW20 Series G Tractors really pay off. Compared to the previous model, they deliver 12% higher rimpull, provide up to 20% faster travel speeds under similar haul road conditions. They can attain a top speed of 35 MPH.

Matched to work with them are the sturdy PH20 Coal Haulers, with a capacity of 62 cu. yd. heaped. The PH20s have a big target for fast loading, a short wheel base for short turning radius—fast spotting. The haulers are built by Athey Products Corporation.

SynchroTouch Transmission Control Optional

Fast as the new DW20s are, you can get even speedier cycles and more payloads per hour from them with optional SynchroTouch Transmission Control. This is an advanced new way to shift gears easier and faster. The operator simply dials the desired gear for automatic, split-second, touch-and-go response. Ask your Caterpillar Dealer to demonstrate the DW20-PH20 on your job. With either the manual shift or SynchroTouch Transmission, it's a big producer!

Caterpillar Tractor Co., General Offices, Peoria, Illinois, U. S. A.

CATERPILLAR

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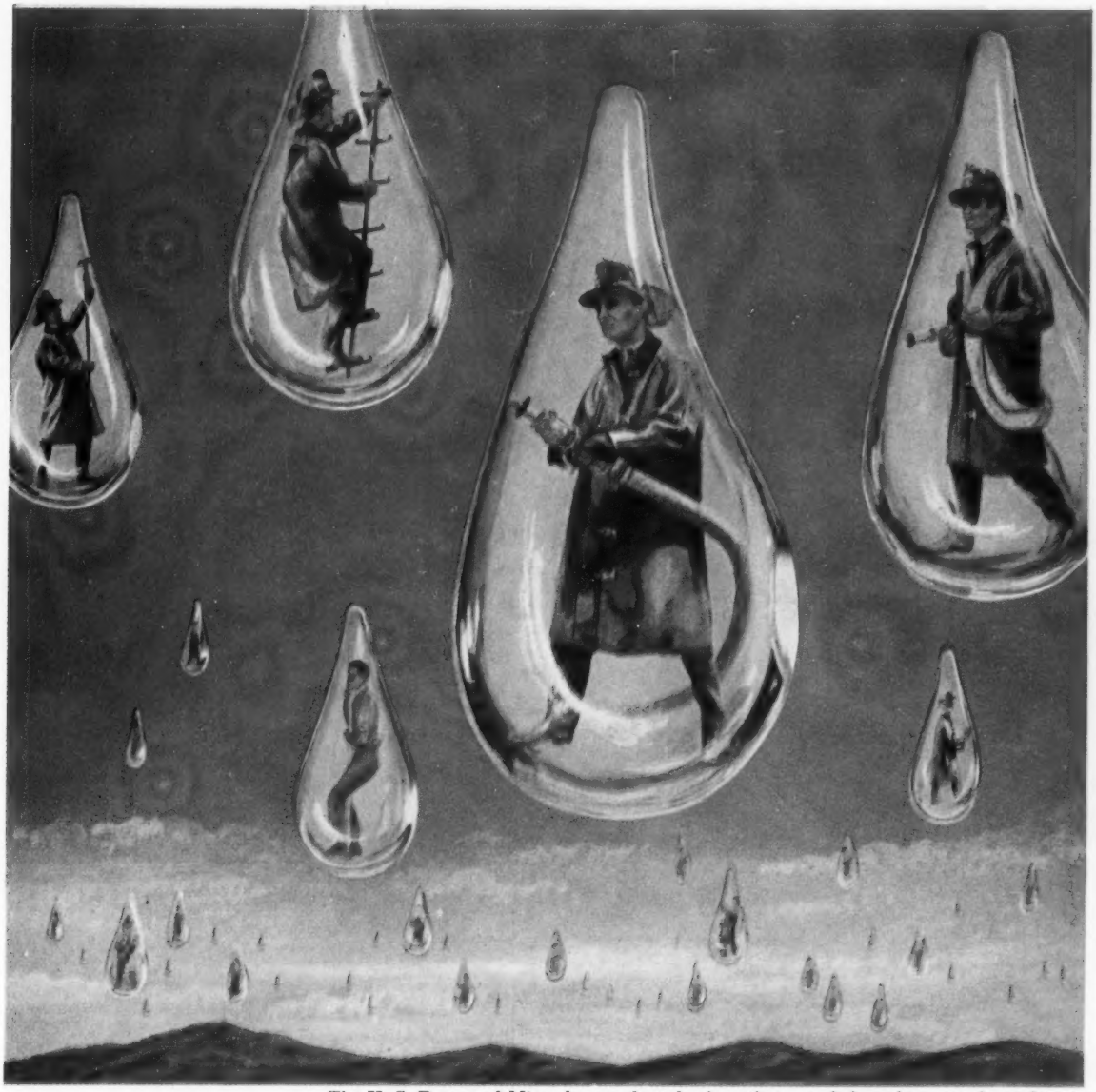
STEP UP PRODUCTION WITH A DW20-PH20



The U. S. Bureau of Mines has conducted a long-time search for a low-cost, fire-resistant hydraulic fluid. A product of Shell Research was the first to earn approval under Schedule 30.

A fireman in every drop

Since hydraulic machinery in underground mines is powered by electricity, fire can be started by a short circuit or overheated motor. If a hydraulic hose is exposed to even a small fire, it can rupture, spraying hydraulic fluid on the fire. When the hydraulic fluid is oil, a serious conflagration follows.

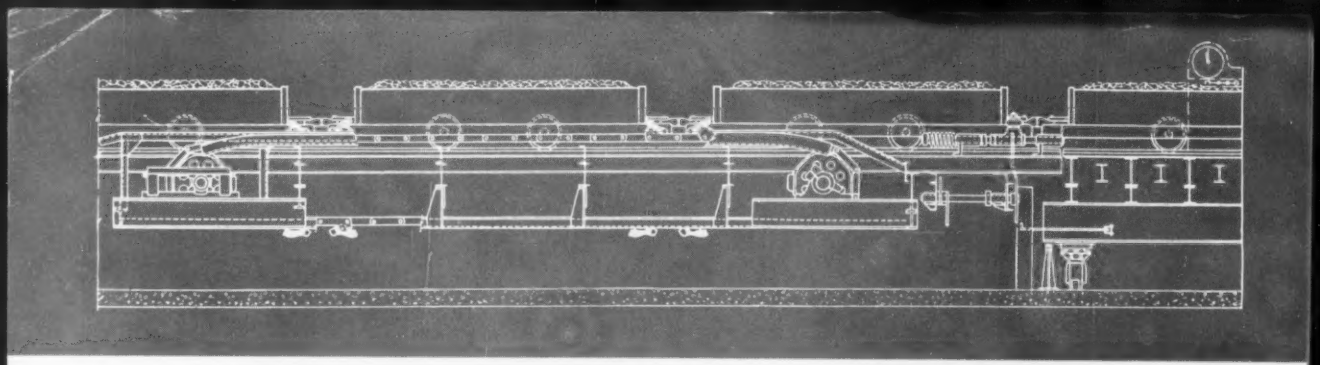
To prevent this hazard, the U. S. Bureau of Mines challenged the petroleum industry to develop a fire-resistant hydraulic fluid—*at a reasonable cost*. Shell Research solved the problem with Shell 3XF® Mine Fluid. It is an emulsion of tiny droplets of water completely gloved in oil. It transfers power with the full efficiency of conventional hydraulic oils, but it cannot act as a fuel because the built-in water drops actually snuff out fire.

Hydraulic fluids which provide safety at low cost are another development of Shell Research. Such scientific achievements assure you better value whenever you buy products bearing the Shell name and trademark.

SHELL

Leaders in Industry rely on Shell

© SHELL OIL COMPANY, 1960



Elevation of typical mine car haul installation. Design includes rugged chain, pushers, and guiding members.

LINK-BELT mine car hauls and dumpers

speed raw coal handling . . . safely

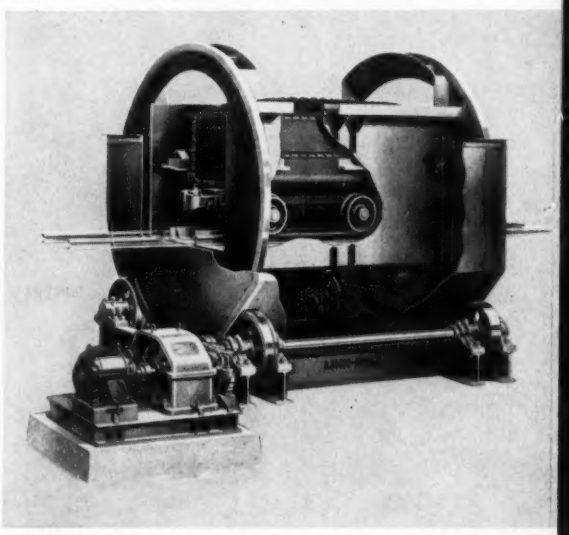
Fast and powerful, yet smooth and gentle—Link-Belt's rugged car hauls ride out the shocks of frequent start-stop operation; rotary dumpers automatically spot one or a train of cars, rotate 360° for thorough unloading and realign accurately in their original position.

Mine cars of all types and sizes are handled easily without damage. Dumpers are capable of unloading cars at a fast rate without uncoupling. Both friction and chain driven types accommodate either 4- or 8-wheel cars.

Modern mining operations include Link-Belt car hauls and dumpers in complete unloading systems or as individual components to increase output. Contact your nearby Link-Belt office. Ask for a copy of Book 2655 describing a complete line of coal handling and preparation equipment.

15,378

POSITIVE-DRIVE DUMPER — Roller chain drive provides maximum control of dumping operation. Revolves 360°, handling all types of cars fast, automatically — without shock.



LINK-BELT

COAL PREPARATION AND HANDLING EQUIPMENT

LINK-BELT COMPANY: Chicago 9, Birmingham 9, Cleveland 20, Denver 2, Detroit 4, Huntington 9, W. Va., Indianapolis 6, Kansas City 8, Mo., Louisville 8, Pittsburgh 13, Seattle 4, St. Louis 1. To Serve Industry There are Link-Belt Plants, Warehouses and District Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

TWO TRAINS UNLOADED SIMULTANEOUSLY — Twin friction-driven dumpers accommodate 10 cars each, dump at the rate of 2800 tons of ROM coal per hour. Mine locomotives pull a full trip of cars through dumpers.